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Environmental databanks on the Chemical Information System

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A paper presented at a seminar on 'Sources of Environmental Pollution Information' held at Aslib on 4 June 1987, and organised by the Aslib Planning, Environmental and Transport Information Group.

The Chemical Information System (CIS) is a system of approximately 30 databanks available as a dial-up online source of interactively available information for chemical compounds and their properties. The system was formerly known as the NIH/EPA Chemical Information System on account of its inception and development by two US Government agencies – The National Institutes of Health and Environmental Protection Agency. It is in particular the involvement by the EPA that explains the emphasis of the system on environmental information and the importance of the CIS as a source of data in this area. The databanks are by and large numeric and text databanks containing actual values and observations (quantitative and qualitative results), in contrast to bibliographic databases which, in general, contain only references to the sources of information. The data is compiled by many different producers and ranges widely in terms of applications. The information available can be broadly categorised as:

1. Chemical and physical properties – including transport and degradation properties, spectra and thermodynamic properties.
2. Toxicology data – including, in addition to acute and chronic toxicity values, mutagenicity, carcinogenicity and teratogenicity data, and also absorption, metabolism and excretion data.
3. Legal and safety information – including, in addition to regulations, transportation and handling information, and also plant and production data.

A given databank can contain data fields falling into any or all of these categories. Of the CIS databanks, several can be identified as being particularly valuable sources of environmental information for chemical substances. The first six are toxicology databanks (Figure 1) describing the effects of chemicals on plants, animals or man – and in most cases (because of the interest of their producers) they specialise in chemicals of concern in the environment.

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FIGURE 1

RTECS (Registry of Toxic Effects of Chemical Substances)
Producer : National Institute of Occupational Safety and Health
Scope : Acute and chronic toxicity measurements, primary skin and eye irritant data, carcinogen, mutagen and tumorigen data.
Coverage : 90,000 compounds

CCRIS (Chemical Carcinogenesis Research Information System)
Producer : National Cancer Institute
Scope : Assay results and test conditions, bibliographic references for:
Carcinogenicity, mutagenicity, tumour promotion, cocarcinogenicity
Coverage : 1,000 compounds

GENETOX (GENEtic TOXicity)
Producer : National Institute of Environmental Health Science/Oak Ridge National Laboratory/Environmental National Laboratory
Scope : Mutagenicity information tested against 38 biological systems. Type of assay, host, type of endpoint, result
Coverage : 2,600 compounds

DERMAL (Dermal Absorption)
Producer : EPA Office of Toxic Substances
Scope : Toxic effects, absorption, distribution, metabolism, excretion data related to dermal absorption of chemicals
Coverage : 655 compounds

AQUIRE (AQUatic Information REtrieval)
Producer : EPA Environmental Research Lab/EPA Office of Toxic Substances
Scope : Acute, chronic, bioacumulative, sublethal effects data, freshwater and saltwater organics
Coverage : 4,000 compounds

PHYTOTOX (Plant Toxicity Data)
Producer : Univ. of Oklahoma, Dept. of Botany & Microbiology/EPA
Scope : Biological effects of application of chemicals to terrestrial plants
Coverage : Over 1,000 compounds

The other databanks (Figure 2) can be termed environmental/hazard databanks and were assembled specifically for environmental monitoring or to aid hazard response, and these contain technical and regulatory information.

Many of the other compounds of CIS are sources of environmental information and some are included in Figure 3.

The Merck Index is not a specialist source of environmental information but does contain a wealth of information on many common chemicals to

FIGURE 2

ISHOW (Information System for Hazardous Organics in Water)
Producer : EPA Environmental Research Laboratory/University of Minnesota/EPA office of Toxic Substances
Scope : Melting points, boiling points, partition coefficients, acid dissociation constants, water solubilities, vapour pressures
Coverage : 5,400 compounds

ENVIROFATE (ENVIROnmental FATE)
Producer : EPA Office of Toxic Substances/Syracuse Research Corporation
Scope : Environmental transformation rates – biodegradation, oxidation, physico-chemical properties – water solubility, V.P., Log P
Coverage : 450 compounds

CESARS (Chemical Evaluation Search and Retrieval System)
Producer : Office of Materials Control, State of Michigan
Scope : Physical and chemical properties, carcinogenicity and toxicity, environmental fate, hazard and handling information, bibliographic references
Coverage : 194 compounds

OHMTADS (Oil and Hazardous Materials Technical Assistance Data Systems)
Producer : EPA
Scope : Physical and identification data, chemical properties, toxicity data, hazard and handling data, etc.
Coverage : 1,400 compounds

CHRIS (Chemical Hazard Response Information System)
Producer : US Coastguard
Scope : Physical and chemical properties, chemical designations, hazard and transport information
Coverage : 1,000 compounds

be found in the environment. Many of the others are rather orientated towards US users – but are still important sources of environmental information.

Another component of the CIS which can be considered here is TSCATS. This is not a databank but rather it is an online index to unpublished health and safety studies submitted under the Toxic Substances Control Act and available on microfiche. It contains 5,100 citations for 1,200 compounds. Online ordering facilities for the microfiche are available on CIS.

The spectroscopic databanks are beyond the scope of this paper and are not considered further, save to say that these have been used to good effect in the identification of pollutants, particularly by mass spectrometric analysis.

FIGURE 3

MERCK
Pharmaceutical information

CASR (Chemical Activity Status Report)
Reference to chemicals studied by EPA

IFIS (Industry File Index System)
EPA regulations on particular industries/chemicals

FRSS (Federal Register Search System)
Index to US Federal regulations on chemicals

TSCAPP (TSCA Plant & Production)
Plant and production data for chemicals

DOWN (Database of Offsite Waste Management)
US waste disposal sites

CTCP (Clinical Toxicology of Commercial Products)
Toxicity information for product ingredients

Most of the databanks, including all the environmental ones are searchable directly by a command language common to all. This is TDRS (Text Data Retrieval System) and contains the usual searching and display features found in other command languages, such as boolean combination and proximity and truncation searching. However, it also allows the transfer of results sets from one databank to another, and, in some cases, display of data from one databank while remaining logged on to another. This is achieved using CAS registry numbers as the common link. In addition, all databanks are linked into a single integrated system by having a central component or registry – SANSS (Structure and Nomenclature Search System).

This acts as a chemical dictionary containing names (and synonyms), molecular formulae, CAS registry numbers and chemical structures. Moreover, it is structure and sub-structure searchable. Thus, in addition to being able to display structures for the chemical being described in the databanks, it is possible to perform a search in SANSS for a family of structurally-related chemicals, then display physical, chemical, biological and regulatory information for them. This can be done without specialised terminal equipment. A teletype even would suffice. Access is possible from the UK via the International Gateway of PSS and TELENET to the host computer in Washington.

The system has been commercially available since the early 1970s but was developed predominantly for in-house use by the EPA, and was hence subject to the vagaries of US Government funding and suffered from a stop-go policy regarding its maintenance and development.

Then in November 1984, responsibility for the system was taken over by a private sector company Fein-Marquart Associates, who had been contractors throughout the development of CIS. Since then it has been run by their subsidiary CIS Inc. as a commercial operation and is now in a period of greater stability. Regular updates to databanks are performed, and system enhancements continue to be made. A related development is the introduction of a microcomputer-based version of TDRS which is available for in-house use with OHMTADS, CHRIS and TSCATS.

Sources of environmental pollution information: the marine environment

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A paper presented at a seminar on 'Sources of Environmental Pollution Information' held at Aslib on 4 June 1987, and organised by the Aslib Planning, Environment and Transport Information Group.

Where do you go to find information and data on marine pollution? This paper sets out to give pointers to the most useful sources, and is divided into three sections: bibliographic sources, data sources and referral sources.

Bibliographic sources

Primary sources

Journals

There are now a number of journals devoted to marine pollution. Probably the most important are *Marine Pollution Bulletin*[1] which includes news, comment, reviews, book reviews and research reports and *Marine Environmental Research*[2] which confines itself to scientific papers and book reviews. Between them, these two journals account for almost 20 per cent of the marine pollution literature. There are many other relevant journals, including a plethora of environmental journals, such as *Aquatic Toxicology, Bulletin of Environmental Contamination and Toxicology, Environmental Science and Technology, Science of the Total Environment,* etc, and new ones are still appearing, as each publisher tries to join the bandwagon.

Reports

Numerous report series are relevant, and only the most useful can be mentioned here. In the UK one of the most important, produced by the Ministry of Agriculture, Fisheries and Food (MAFF) is the *Aquatic Environment Monitoring Reports.* This series includes the annual report on levels of radioactivity in surface and coastal waters of the British Isles[3]. It also includes regular reports of the monitoring of levels of metals, pesticides and PCBs in marine fish and shellfish[4]. MAFF also produce another series, *Fisheries Research Technical Report*[5], which has included a dozen documents on the field assessment of dumping wastes at sea, at the various dumping grounds around the coast.

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In the US many relevant report series are produced. All of them are available from the National Technical Information Service (NTIS). They are listed in the NTIS publication *Environmental Pollution and Control*[6], and the British Library receive copies of most of them.

There are several relevant international report series. The Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP), a United Nations Agencies-sponsored group, have published about 30 reports on different aspects of marine pollution in their series *Reports and Studies GESAMP*. The most recent report is on environmental capacity[7], the capacity of the environment to absorb pollutants without unacceptable harm. Previous reports have been on atmospheric transport of pollutants into the Mediterranean region, thermal discharges in the marine environment, and some reviews of potentially harmful substances, including several metals. The United Nations Environment Programme (UNEP) are very involved in co-ordinating work on marine pollution. Their Oceans and Coastal Areas Programme is working in about 10 areas around the world, including the Mediterranean, the South Pacific, the East Asian Seas, etc. Two important series produced by them are *Reference Methods for Marine Pollution Studies*[8], which as its title suggests is concerned with analytical and sampling techniques, and *Regional Seas Reports and Studies*[9], which is mainly concerned with the pollution situation in the different areas and the steps being taken to control it. The oldest international organisation involved in marine pollution is the International Council for the Exploration of the Sea (ICES); its *Cooperative Research Reports*[10] report on the work of monitoring metals, pesticides and PCBs in fish and shellfish, on the work of their Advisory Committee on Marine Pollution, on the methodology of fish disease surveys, and on intercalibration exercises, etc.

Books

Two books and one book series are worthy of mention. For a general introduction to the subject of marine pollution, Professor Clark, editor of *Marine Pollution Bulletin*, has written an introductory text called simply *Marine Pollution*[11]. At the other extreme, there is a series of six books with the general title *Wastes in the Ocean*[12-17], which cover almost all aspects of oceanic marine pollution in considerable detail. And for legal aspects, a most useful summary of UK marine pollution law[18] has been written by a barrister, John Bates.

Conferences

Only those conferences that have established themselves on a regular basis will be listed here. The biennial oil pollution conference jointly sponsored by the American Petroleum Institute, the US Coast Guard and the US Environmental Protection Agency, is worthy of mention[19]. It is the main venue for discussion of oil pollution, and is truly international. The proceedings of the 1987 conference are now available. The management of bottom sediments, particularly the problems of dredging, are discussed in the joint US-Japan expert meeting reports[20]. So far there have been about 12 reports. The Japanese experience with metals in sediments is of particular interest, after their problems with mercury in Minamata Bay. Ocean disposal is discussed in the International Ocean Disposal Symposia (the series *Wastes in the Ocean*[12-17] was based on papers presented at these). Marine pollution in the Mediterranean is the subject of a series of 'Study Days' organised by the International Commission for the Scientific Exploration of the Mediterranean Sea[21].

Secondary sources

Abstract journals

Three abstract journals are particularly useful for the subject of marine pollution. For those looking for information on chemicals, *Chemical Abstracts*[22] is the best source, because of its unique chemical registry number, which identifies each chemical mentioned in a paper. For taxonomic and biological information, *Biological Abstracts*[23] is probably the best source, because of its detailed taxonomic biosystematic codes. But for the most complete coverage, *Aquatic Sciences and Fisheries Abstracts (ASFA)*[24] is probably the best abstract journal. It is particularly useful for geographic searches, because of its unique hierarchical geographic indexing system, which allows one to search for particular sea and land areas. *ASFA* covers the world literature on the science, technology and management of marine and freshwater environments, and is a co-operative venture which involves three United Nations Agencies and input centres in 12 countries. The Marine Biological Association (MBA) is the UK national co-ordinating input centre, with a total of seven UK input centres. MBA has a particular remit to ensure a good coverage of marine pollution in *ASFA*, and to ensure that all relevant UK marine science and technology is included.

All three abstract journals mentioned are available online through a number of hosts in Europe and the US. In addition, ASFA is now available on CD-ROM, on a compact disc holding all the information, including abstracts, added to the database since 1982. The information is updated semi-annually, when a replacement disc is provided in exchange for the original. Using the Compact Cambridge software provided by the publisher, Cambridge Scientific Abstracts, the database can be searched as if one is online, but of course with unlimited access. An IBM or similar PC computer is needed and a compact disc player and CD-ROM to access the information on the disc.

Current awareness bulletin

At MBA a monthly current awareness bulletin, *Marine Pollution Research Titles*[25] is published, which lists in 15 subject groups all the documents on marine pollution collected by the Marine Pollution Information Centre. In 1986 over 2,600 documents were added to the centre's collection.

Marine Pollution Research Titles is available on subscription and is currently sent to 28 countries.

Bibliographies

Most of the bibliographies on marine pollution are either about a particular pollutant, or are about a specific geographic area. Hence, for example, there have been a series of reviews, accompanied by bibliographies, produced by the International Copper Research Association, on the biological importance of copper[26]. Copper, of course, has been used for many years as an antifouling coating. UNEP have produced a number of bibliographies about their regional seas, for example on the Mediterranean[27]. Over a period of time they hope to produce one for each regional sea. MBA produces an annual bibliography on British estuarine and coastal waters[28], arranged geographically around the UK coast, and covering all aspects of the marine environment including pollution. All relevant bibliographies are collected at MBA, so it is worth asking, if a problem is encountered.

Criteria documents

The United States Environmental Protection Agency has produced over 60 criteria documents on individual chemicals and chemical groups. These review the toxicity and effects data for the aquatic environment, and reach some conclusion on the safe level which can be allowed in that environment[29]. The Water Research Centre has undertaken a similar exercise, for a more limited number of chemicals, for the UK environment.

Data sources

Data compilations

Apart from the criteria documents already mentioned, there are a number of data compilations that are relevant. For metal levels in the marine environment there is a very comprehensive book by Ronald Eisler[30]. It is arranged by taxonomic group, and then by individual metals. For organic chemicals there is a compilation by Verschueren[31] (this covers all environments, not just marine). There are many other compilations, but unfortunately the marine environment is usually either covered poorly or completely overlooked.

Databanks

The EEC databank Environmental Chemicals Data and Information Network (ECDIN) has a large amount of data on the marine environment, both for effects data and also for accumulation of compounds in organisms. The UN databank International Register of Potentially Toxic Compounds (IRPTC) also has good coverage, although only selected data is included. It deals with the same files as ECDIN, but adds some others, notably levels of chemicals and legal aspects. The Chemical Information System

(CIS) also has a good coverage: it is similar to ECDIN and IRPTC. Many individual countries have their own marine databanks, usually with data on levels of compounds in seawater, sediments and organisms, and sometimes with effects data too. Unfortunately they are not usually available to outside researchers, except by special arrangement.

Referral sources

Directories

UNEP have produced a number of directories, and the intention is to produce one for each of their Regional Seas[32]. Each lists the marine research centres in its area, giving details of staff, equipment, facilities available and research undertaken. Another useful compilation is produced by the Natural Environment Research Council on behalf of all the Research Councils[33]. It includes details of all the pollution research undertaken by or sponsored by the Research Councils, and therefore includes the majority of the pollution research in the UK. It gives details of projects, staff involved, cost and duration of the research.

MEDI, the Marine Environmental Data Information Referral System, is a sectoral focal point for marine sciences within INFOTERRA. The MEDI Centre is in Paris, staffed by the Intergovernmental Oceanographic Commission. It is a computerised system, which may be available online in the future, giving information on data files about the marine environment existing in national and international centres. It covers all aspects of the marine environment, and a printed version is also available[34].

Other sources

Some useful sources have already been mentioned in other contexts: for news and current affairs, *Marine Pollution Bulletin*[1] is the best source; for expert overviews, GESAMP[7]; for current UK research, the Research Council compilation[33]. UNEP has been mentioned a number of times already. Their Oceans and Coastal Areas Programme, based in Nairobi[35], has been responsible for the production of many useful reports and compilations. For information on marine litter, the Keep Britain Tidy Group are the best source[36]. They have produced a number of reports on marine litter and the problems it causes. For problems of handling wastes, the Waste Management Information Unit at Harwell is the best source. For most other aspects the Marine Pollution Information Centre is at least a good starting point.

Marine Pollution Information Centre

The Marine Pollution Information Centre was established in 1970 and collects information and data on all pollutants in the marine and estuarine environment. All scientific and technical aspects are covered, but legal, economic and social aspects are excluded. The centre now has over 40,000 documents which are available for reference. Visitors are welcome to come and use the facilities; the centre is part of one of the major marine science libraries in the world. A monthly current awareness bulletin, *Marine Pollution Research Titles*[25] is produced, and data extraction is undertaken on contract for ECDIN and IRPTC, two online databanks. Enquiries are answered, bibliographies prepared on contract, and advice and help is given to scientists and technologists from all over the world who are working on marine pollution, or writing books, reviews and contract reports.

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Sources of environmental pollution information: radioactivity

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A paper presented at a seminar on 'Sources of Environmental Pollution Information' held at Aslib on 4 June 1987, and organised by the Aslib Planning, Environment and Transport Information Group.

Since international relations are highly developed in radiological protection, many of the sources of information are international agencies or organisations overseas. This paper explains the role of the more important agencies, particularly the International Commission on Radiological Protection and the International Atomic Energy Agency. For the UK it describes the distribution of responsibilities within government and industry, and summarises the role of the National Radiological Protection Board. Finally, it points to factors which are likely to generate even more work for librarians.

Of all the British public's experience of radioactivity, Chernobyl is probably perceived to be the most dramatic. It not only triggered a profound short-term emotional response, but also a lasting effect in the way the public views environmental pollution. Bear in mind that on 26 April 1986, an accident 2,000 kilometres away at a nuclear plant on the Pripyat river, in the Ukraine, produced a cloud of radioactive pollution that drifted on the winds across Europe for a week and eventually moved across almost the whole of the UK, with rain washing radioactivity out of the cloud and producing heavy pollution of pastures in some areas. The consequences, in the form of contaminated sheep, are still very evident, and the accident was accompanied by saturation media coverage.

On the bank holiday weekend of 3–5 May, Central Government closed down because it was known – from information received from our contacts across Europe – that the cloud from Chernobyl did not contain radioactivity in such concentration as to be a direct threat to human health. The National Radiological Protection Board (NRPB) continued to work, co-ordinating radiation monitoring, collating data, and advising the Government. It also issued at least one statement each day to the media, answered innumerable media enquiries and provided staff for interviews: they appeared on all the major news programmes. Gradually, the public got to know the NRPB's phone number and, in an upsurge of concern and

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curiosity, swamped its telecommunications. By 8 May, the NRPB's switchboard was jammed at 8 am, when it was switched on. After the bank holiday, the Government departments resumed their statutory roles. In particular, the Department of the Environment set up its public information point, and the Agricultural Ministeries, which had begun monitoring before the cloud arrived and stepped up their effort after the rain, became additional sources of information. Indeed, in the long-term, the supply of monitoring data on contamination of pastures and sheep has been the major issue in the Chernobyl aftermath. But another important consequence has been the increased demand for information on all aspects of radioactivity in the environment and its effect on man. By August 1986, NRPB had dealt with 15,000 telephone calls from the public. And NRPB staff have been in great demand as speakers at meetings in the UK and overseas. Part of the talk invariably dealt with the biological effects of radiation.

Standards and their biological basis

Biological effects of radiation

The biological effects of radiation have been studied for over 80 years, not least because of their potential adverse effects on the health of those who work with radiation (but also for their diagnostic and therapeutic value). Because of the huge increase in the use of radioactive materials since 1945, especially in the nuclear industry, particular laboratories have become well established with large scale research programmes in radiobiology. They include, in America, the Argonne National Laboratory, Illinois; Inhalation Toxicology Research Institute, Lovelace Foundation, Albuquerque, New Mexico; Los Alamos Scientific Laboratory; University of Utah; Battelle Pacific Northwest Laboratory, Richland, Washington. In Europe, the following laboratories are well established: in France, the laboratories of the Commissariate à l'Energie Atomique at Fontenay-aux-Roses; in Germany, in the Karlsruhe nuclear research centre; and in Belgium, the CEN Laboratories of Mol. In the UK, there is the Medical Research Council's Radiobiological Unit (RBU) at Harwell and the Clinical and Population Genetics Unit at Edinburgh; and, since 1970, the NRPB, which has its headquarters and main laboratories at Chilton, Oxfordshire. Since the NRPB is both a user of, and a provider of, information in radiobiology you will find these and other sources of information listed in the references to some of its reports.

United Nations Scientific Committee on the Effects of Atomic Radiation

This committee, generally known by its acronym UNSCEAR, was set up in 1955 out of concern about the level of radiation exposure of the world's population from radioactive fallout. The interests of the committee have broadened over the years to include all sources of radiation and it has published major review documents on levels of exposure and biological effects. More recently UNSCEAR has separated these two aspects of its work and in 1986 it published a preliminary review of biological effects[1]. UNSCEAR studies provide the main biological basis for international radiation protection standards.

The BEIR Committee

Another major review[2] is carried out by the BEIR Committee, a committee of the American National Academy of Sciences. The BEIR reports have a strong influence on radiological protection in the USA and elsewhere.

Standards

The primary international body concerned with standards is the International Commission on Radiological Protection. The Members of the Commission are appointed every four years by the International Congress of Radiology. Both bodies are non-governmental. The Commission has been functioning since 1928, when it was first established as the International X-ray and Radium Protection Commission by the Congress, and it took its present name and organisational form in 1950[3]. It makes recommendations relating to the fundamental principles on which radiation protection measures can be based and recommends a system of dose limitation, and methods of ascertaining dose, based on radiobiological knowledge and a consideration of statistical information relating to the incidence of disease and accidental death in various walks of life.

Membership of ICRP is based solely on the recognition of merit and experience in radiological protection and the related fields of science and medicine. Those who serve on the Commission do so strictly in their personal capacities and represent no-one. The present Chairman of ICRP is an Argentinian and the Vice-Chairman a Frenchman; the Secretary is British. The Commission has four standing committees: the Chairmen are members of the Commission. The Royal Commission on Environmental Pollution[4], in its sixth report, stated as one of its principal conclusions: There is no better way of deriving basic standards than on ICRP recommendations, given that the scientific standing and independence of its members is maintained. ICRP issue their recommendations in a series of publications known as the *Annals of ICRP*, published by Pergamon Press. In 1977, they published a revised version of their basic recommendations, applicable across the whole field of radiological protection in Publication No. 26[5]. (The previous version was published in 1965.) Publication No. 26 introduced little or no change in the more important basic dose limits but there are important changes in emphasis and in methods of estimating doses for protection purposes. ICRP makes recommendations. They are not binding on anyone. The Commission's authority derives from the fact that its recommendations are, as far as anyone can tell, almost universally accepted. NRPB has published reports which consider the ways in which standards are applied in different countries[6].

International information sources

United Nations agencies

Although WHO, ILO and other UN agencies have an interest in radiological protection, the main information source is the International Atomic Energy Agency in Vienna. The IAEA publishes safety series, conference proceedings, panel proceedings, technical reports, a monthly bulletin, a quarterly list of meetings, conferences, etc., and, of course, is responsible for the indexing and abstracting service the International Nuclear Information System (INIS), invaluable in radiological protection. INIS is the foremost database in the field of nuclear sciences and radiation protection. It is hosted by the IAEA in Vienna, and is compiled from data submitted by 74 national INIS centres and 14 international organisations. Each centre is responsible for cataloguing, abstracting and indexing all documents within the INIS subject scope which are published within its borders. The IAEA's status was immensely enhanced as a result of its performance during the Chernobyl emergency. WHO has published reports relating to the Chernobyl accident[7], and nuclear power generally, and on radon (as part of a report on indoor air quality).

Nuclear Energy Agency of OECD

The Nuclear Energy Agency of the Organization for Economic Co-operation and Development is a particularly successful example of international co-operation in nuclear energy and related subjects including radiological protection. It comprises 24 developed countries, including the UK, and is generally concerned to promote principles which are subsequently incorporated into the administrative and legal systems of member states. In radiological protection, NEA publishes standards for consumer products, *Nuclear Law Bulletin* and proceedings of conferences that it has organised, eg, on radioactive waste. NEA publications should be obtained direct from the Agency at 38, Boulevard Suchet, 75016 Paris.

European Communities

The Commission of the European Communities is important as a source of information because it has a substantial 'Biology/Health Protection Programme' and because it finances investigations of various kinds in the member states, and publishes the results. Sometimes these are in the form of reports, available free of charge, such as a recently published study by NRPB of the radiological consequences of Chernobyl in the countries of the EC[8], and sometimes a commercial publisher is used. The member states of the EC are subject to a Directive on Radiological Protection which is binding in member states as to its objectives. It contains recommendations based essentially on those of ICRP contained in Publication 26. The text of the Directive was published in the Official Journal[9].

Miscellaneous sources overseas

The publications of the American National Council on Radiation Protection and Measurements (NCRP) are considered particularly valuable; they are available from NCRP Publications, 7910 Woodmont Avenue, Bethesda, MD 20814 USA. The publications of the International Commission on Radiation Units and Measurements (ICRU) are available from the same address.

Information sources in the UK

In the UK, radiation hazards are treated constitutionally as just another kind of risk, so that government organisations with responsibility for, say, protecting coastal waters from chemical pollution are also responsible for protection against radioactive contamination; and those legally responsible for enforcing health and safety at work include radiological protection as part of their functions. In fact, Ministry of Agriculture, Fisheries and Food (MAFF) has an interest in radioactivity in two ways, through its Directorate of Fisheries Research, which publishes reports on radioactivity in surface and coastal waters of the British Isles each year[10]; and through its Food Sciences Division – the division of MAFF which has born the brunt of assessing the effects of radioactivity on crops and livestock – which proposes to issue reports on surveys of radioactivity in the agricultural environment around the major nuclear sites. The Department of the Environment is the ministry primarily responsible for 'solving the radioactive waste problem'. It has an advisory committee – the Radioactive Waste Management Advisory Committee which publishes an influential annual report. Many other organisations are engaged in research and development work and in monitoring, and DoE has published major reviews of radioactive waste policy[11], research[12] and monitoring[13] in this field. The DoE publication *Digest of Environmental Protection and Water Statistics* contains tables of data on radioactive discharges, and interpretation of that information. More detailed data, and interpretation, is contained in the annual publications of British Nuclear Fuels plc, the UK Atomic Energy Authority and the Central Electricity Generating Board. The Scottish Development Department publish an annual report on environmental monitoring for radioactivity in Scotland.

The major organisations in the nuclear industry have created NIREX – a company with the responsibility for finding sites for disposal of low and intermediate level waste. NIREX publish conference papers and a variety of booklets of general interest, as well as an annual report.

Inquiries

The major inquiries on various aspects of nuclear power have been a substantial source of information. They include the 6th report of the Royal

Commission on Environmental Pollution[4], the government's response[14], a report of Mr Justice Parker on the Windscale Inquiry[15], and the government's response[16], the report of the Select Committee on the Environment on the control of radioactive waste[17], and the government's response[18], and the report published this year, Sir Frank Layfield's inquiry into the proposal to build a pressurised water reactor at Sizewell, in Suffolk[19].

I now want to refer briefly to two particularly unusual aspects of radioactivity in the environment.

Chernobyl

Immediately after Chernobyl, the NRPB published a variety of papers in learned journals such as *Nature*. Later, it published a compilation of these and other papers on Chernobyl[20]. The Ministry of Agriculture published press statements listing a great deal of data relating to contamination of foodstuffs and also a report on monitoring of surface and coastal waters[21]. The Scottish Office published data and interpretation and in due course the Welsh Office published a compilation of data for Wales. The Institute of Terrestrial Ecology, part of the Natural Environment Research Council, is carrying out studies for MAFF and has been another source of information.

Radon

Radon is a naturally occurring radioactive gas produced by the decay of uranium, which is widespread in nature in small quantities. In the open air the radon simply disperses but that which is produced beneath houses finds its way indoors where it tends to concentrate, to an extent which depends in part upon the ventilation. Inhaling radon is therefore a natural part of our existence. Radon itself, being a gas, is merely exhaled but during its own radioactive decay it changes into solid materials which, when inhaled, lodge in the lung delivering their radiation dose to the surrounding tissue. The NRPB has carried out national studies and determined the average doses for the UK. It has also carried out more detailed studies in areas where there are greater concentrations of uranium, and found rather higher doses being received by the occupants of dwellings in those areas. NRPB has advised the government on dose levels at which to limit exposure[22, 23] and the government has accepted its advice. The problem is at its worst in the south west of Britain and a major effort is now underway, financed by the Department of the Environment, to investigate the high dose houses to decide whether remedial work should be undertaken. It should be noted that already, in some parts of the south west, houses have been found in which the occupants receive radiation doses well above that allowed to workers at the nuclear industry. NRPB is working with the Building Research Establishment to devise remedial measures. The NRPB has already published a number of scientific papers on radon.

National Radiological Protection Board (NRPB)

The NRPB is a public authority created by the Radiological Protection Act, 1970, which came into effect on 1 October of that year and applies to the whole of the UK. The Government's purpose in proposing the legislation was to establish a national point of authoritative reference in radiological protection. The Statute gave the NRPB the following functions:

- by means of research and otherwise, to advance the acquisition of knowledge about the protection of mankind from radiation hazards;
- to provide information and advice to persons (including government departments) with responsibilities in the UK in relation to the protection from radiation hazards either of the community as a whole or particular sections of it.

The Act also empowered the NRPB to provide technical services to persons concerned with radiation hazards and to charge for those services. The Act also provides for a Board consisting of a Chairman and seven–12 other members, who are appointed by the Health Ministers. The present Chairman of the Board is Sir Richard Southwood, FRS, a professional ecologist who was previously Chairman of the Royal Commission on Environmental Pollution; it was recently announced that he will be the next Vice-Chancellor of Oxford University.

NRPB publications

NRPB's interests cover every aspect of protection against both ionising and non-ionising radiation. It is independent of industry and other users of radiation, of the regulatory bodies and of pressure groups, but needs to communicate with these and a variety of other audiences, each with its particular interest. Inevitably, NRPB communicates with these audiences in many ways, through correspondence, at meetings and conferences, through the press, etc. It publishes much of its information in scientific journals. However, NRPB has also developed its own system of publications, which are described below. The system reflects the diversity of subject matter and of interested parties.

Standards
Advice on standards for protection (ASPs)
Emergency reference levels (ERLs)
Guidance on the application of protection standards (GS series)
Consultative documents

Reports
Scientific and technical reports (NRPB-R series)

(These reports cover all aspects of radiological protection. Although many are specialised there have been some of interest to the general public and

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others which, although very technical, deal with matters of strong public interest. For instance, two weeks before the Chernobyl accident occurred, NRPB published report NRPB-R182, its staff emergency handbook, together with a report from the GS Series which contained reference data for government action in emergencies. Another report, NRPB-R171, dealt with radiation doses to the residents of Seascale and was important evidence submitted to the Black inquiry which tried to determine whether the incidence of leukaemia could be related to radiation doses to the population of that village. Another report, NRPB-R183, is an inventory of radiation doses to people in Britain from all sources. Over 200 reports have been published in this series.)

Instrument evaluation reports (NRPB-IE series)
Technical memoranda*
Periodic reports
Radiological protection bulletin*
A booklet, Living with Radiation, for the layman
Information sheets*
Brochures*

A list of all NRPB publications currently available can be obtained from the Information Officer at the NRPB. Except where indicated by an asterisk, the publications are available from HMSO. In addition, many NRPB reports and other publications are available on microfiche from Chadwick Healy Ltd., and are listed in their 'catalogue of British official publications not published by HMSO'.

Future developments

The Working Party on Public Access to Environmental Information, in their report published in April 1986, recommended new primary legislation as follows: 'On control of radioactive wastes, there is at present no power for the responsible Government departments to make information public. It is recommended that new legislation should confer powers to make information available, including the power to require public registers to be kept at prescribed places setting out information related to certificates issued under the Radioactive Substances Act 1960.'

In its report the committee noted that the Act is expressed in restrictive terms which operate against disclosure and that the government would need new statutory powers to disclose information. Much of the information already acquired under the Act lends itself to keeping on registers which could be made available publicly in for example the relevant authorising department's library. At the same time, copies of certificates and authorisation sent to local authorities could be required to be kept in publicly available registers. The need to protect national security and commercial confidentiality were noted.

In general, the controversy over nuclear power is one of those debates that goes on at two levels, partly among specialists and partly among laymen; the debate among laymen is greatly influenced by that among the specialists. The nuclear debate is now part of the main stream of politics but the role of the specialists is still there. Inevitably, they will need information from libraries. Given the scale and intensity of the debate, and the government's policy of greater openness, it would seem to be one of those processes that will continue to keep you busy and, indeed, generate even more work for you than before.

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International sources

Judith Deschamps

Department of the Environment Library, (Judith Deschamps is currently National Contact for the International Register of Potentially Toxic Chemicals, INFOTERRA the International Environmental Information System and the Chemicals Information Switchboard).

A paper presented at a seminar on 'sources of Environmental Pollution Information' held at Aslib on 4 June 1987, and organised by the Aslib Planning, Environment and Transport Information Group.

The services I am going to talk about are sponsored by the United Nations Environment Programme, OECD (the Organisation for Economic Cooperation and Development) and the Commission of the European Communities. Many databases, available online and otherwise, include information from a large number of countries. The aim of this paper is to provide an introduction to some less-widely publicised activities which can assist you in obtaining information on environmental chemicals and pollution.

United Nations Environment Programme services (UNEP)

First a brief introduction to UNEP's origins. In the late 1960s and early 1970s, there was a growing awareness in many countries that international co-operation was needed to deal with environmental problems such as oil spills and river pollution, where the effects went beyond national boundaries. Various existing United Nations Agencies already dealt with environmental areas, for example forestry and foods, but by 1968 the UN saw that a comprehensive approach was needed. Its General Assembly, therefore, called a world conference on the environment. This was held in Stockholm in 1972. UNEP was established during the conference and given three functions:

- environmental assessment, including monitoring, research, information exchange, evaluation and review;
- environmental management, including law;
- support services, such as education and training.

UNEP was not intended to 'take over' the activities of existing UN agencies, but rather to have a catalytic role.

Aslib Proceedings, **40** (5), May 1988, p.157–162. Printed in Great Britain.

The first UNEP service I shall describe is IRPTC, the International Register of Potentially Toxic Chemicals. This system, together with other UNEP services, was largely designed to meet the needs of developing countries, so that they could benefit from the experience of the more advanced nations. Nevertheless it, and the other UNEP services have much to offer to all information seekers. IRPTC became operational in 1976. Its main objective is to help reduce the hazards associated with chemicals in the environment by supplying information to those responsible for human health and environmental protection. It provides data for evaluating the hazards associated with particular chemicals, and tries to identify gaps in existing knowledge on the effects of chemicals. IRPTC also holds information on national, regional and global regulations and standards. This is how it operates:

- It has a central unit at Geneva which holds data on computer. Staff will answer enquiries, using IRPTCs database and other information sources available to them. It does not offer an online service.
- It has a network of national correspondents. We publicise the service, answer questions sent to us by Geneva, and liaise with other bodies (usually government departments) to provide input to the system – documents on topical subjects, and to obtain help in answering enquiries. National correspondents used to distribute the *IRPTC Bulletin*, but a charge is being made for it from the next issue and subscriptions will be dealt with by the UN.
- It has built up a network of data suppliers, such as the United States National Institute of Occupational Safety and Health which provides the RTECS (Registry of Toxic Effects of Chemical Substances) file. IRPTC also collaborates with the European Communities ECDIN databank (Environmental Chemicals Data and Information Network) in the collection and exchange of data. The IRPTC Legal File, which I shall describe just now, is accessible online via ECDIN. I will tell you more about ECDIN later on.

IRPTC has developed a detailed format for inputting data to its computer files. Categories of information held are toxicity to mammals and man, and effects on non-mammalian organisms and plants. It also disseminates the information it has collected, either in the *Bulletin* or in monographs, such as: IRPTC Legal File. The volumes contain legal data profiles and details of regulations on named chemicals. A second edition was published later in 1987. It will contain information from 12 countries and six international organisations on around 600 substances. Incidentally, the online version, available via ECDIN will contain information on around 5,000 chemicals. The Legal File can be used for example, to trace regulations governing the use of methyl isobutyl ketone as a pesticide ingredient in the USA or Indian recommendations for packaging and labelling of nitrobenzene. The file also gives occupational and environmental standards for chemicals, e.g. TLVs (Threshold Limit Values). For each record,full details are given of the related documentation.

IRPTC has co-operated with the USSR State Committee for Science and Technology in the production of a series of monographs reviewing the Soviet literature. Around 100 titles have been published so far. Chemicals which have been reviewed include asbestos, benzene, cadmium, formaldehyde, nitrates, and a large number of pesticides. A recent example of a 'one off' monograph, also produced in co-operation with the USSR, is *Principles of pesticide toxicology*, a textbook, based on Soviet experience. It contains tables of exposure limits for workers and maximum allowable concentrations of pesticides in foodstuffs, together with numerous references to the Soviet literature.

IRPTC is a Special Sectoral Source for INFOTERRA. That is, it has agreed to provide substantive information, and, where appropriate, publications to enquirers from developing countries. It also works closely with UNEP's Industry and Environment Office, with the International Programme on Chemical Safety (IPCS) and with the OECD Chemicals Information Switchboard. These services will be described later.

The International Programme on Chemical Safety came about as the result of a resolution passed at the 1977 World Health Assembly. IPCS is a joint programme of UNEP, the International Labour Office and the World Health Organisation. Its objectives are to evaluate the effects of chemicals on human health and on the environment; develop guidelines on exposure limits; develop methodology for toxicity testing and related studies, and co-ordinate such studies; develop information for dealing with chemical accidents. It is a strengthening and extension of existing work, for example that carried out by IARC (the International Agency for Research on Cancer) who issue the series of monographs, on the evaluation of the carcinogenic risk of chemicals to humans. IPCS has a central unit at WHO Headquarters which is supported by a network of committees, national and other key institutions. Its publications include the *Environmental Health Criteria* Series, around 70 documents have been produced so far. Chemicals covered include the usual toxic metals; air pollutants e.g. oxides of nitrogen and sulphur; pesticides, and solvents. Other titles deal with physical factors such as noise, radiofrequency and microwaves.

Another UNEP service is provided by the Industry and Environment Office. This organisation is located in Paris. It was set up in 1973 to bring government and industry together to co-operate in reducing the adverse impact of industries on the environment. It works in two ways:

- It has built up a computerised databank, The Industry and Environment File. Information for this is obtained from key organisations in specific industrial sectors, such as pulp and paper, and petroleum. Topics included in the database are:

- pollution abatement and control technologies
- ambient quality standards
- environmental technology costs

Each file is cross-referenced to IRPTC and to INFOTERRA. The databank is not available online, but the office's staff will access it and other information sources on your behalf. The office also publishes a quarterly newsletter, *Industry and Environment*. Each issue focusses on a specific area, such as Low- and non-waste technology, and recycling and recovery in the metals industry. It was issued free of charge until the end of last year. It is now available on subscription for $45/year.

The second service for which the author is the official UK contact is INFOTERRA, the International Environmental Information System. INFOTERRA is unlike the services already described in that:

- It covers the broad environmental subject area (including planning, transport and environment!).
- Its operation is based on the referral principle, that is it refers enquirers to sources of information or expertise. However, factual information is supplied in the majority of cases, especially to enquirers from developing countries. It is a valuable source of information on environmental chemicals. Many of the sources included in its *International Directory* are concerned with chemicals and related topics such as pollution and wastes. It also has a network of National Focal Points from around 130 countries worldwide who can be approached for information. INFOTERRA is of particular value where multi-disciplinary topics are concerned. It has two key components.
- The *International Directory* which contains descriptions of around 7,000 information sources, such as Government departments, research organisations, university departments, and private consultants. A copy of the directory, which is updated every two years, is held by each National Focal Point. A handbook, which will include abbreviated descriptions of the sources, plus information about key documentation centres and databases is about to be published for sale.
- The second, and equally important, component is the network of National Focal Points. Each NFP has links with, and knowledge of, information services and centres in its own country. Requests for information are made through National Focal Points.

INFOTERRA has also designated a number of Special Sectoral Sources who offer a wider range of services, including the provision of substantive information. Examples of such sources in addition to IRPTC and the

Industry and Environment Office are the Commonwealth Agricultural Bureaux (now called CAB International), the Waste Management Information Unit at Harwell and the Environmental Law Information Service (ELIS) of the International Union for the Conservation of Nature and Natural Resources (IUCN).

OECD Chemicals Information Switchboard

I now move away from UNEP to an OECD project, the Chemicals Information Switchboard. The Switchboard which has just come to the end of its pilot phase was set up two years ago by the OECD Chemicals Group to help with the problem of finding information on chemicals which is available only in the 'grey literature' or which is unpublished but available on request, for example data intended for future publication or negative results which are often never published.

The service operates on the referral principle. For the pilot study NFPs and networks of participating organisations were set up in six countries (Federal Republic of Germany, Japan, Netherlands, Sweden, UK and US). Enquiries received by an NFP are passed to relevant domestic sources and to the NFPs of the other participating countries. Information providers reply direct to the requestors with whom they can negotiate any fees or special conditions for the release of information which may be commercially sensitive. Participants have co-operated with NFPs in monitoring the project, and an independent consultant has prepared a report, a summary of which will be considered by an OECD management meeting later this year. The recommendation is that the Switchboard should continue, and in the interim queries will be accepted.

Services of the European Communities

The meeting accepted the recommendation that the Switchboard should continue. All other OECD countries were invited to participate. Finally, I come to services offered by the European Communities. The first of these is ECDIN (Environmental Chemicals Data and Information Network). It was initially conceived as a network-based system. However, for a number of reasons, it is at present the online equivalent of a chemical handbook. The main categories of topics included in the commercial version, which can be accessed via the Datacentralen Host Centre are:

Identification
Physico-chemical properties
Production and use
Legislation and rules
Occupational health and safety
Toxicity
Concentration and fate in the environment
Detection methods.

Most categories are broken-down into a number of separate files, e.g. effects on soil micro-organisms and aquatic bioaccumulation. ECDIN is accessed using a simple menu-driven system. It contains basic identification data for around 65,000 chemicals, individual files vary considerably in the number of chemicals included.

Another EC database which is worth considering is the Directory of Environmental Research Projects in the European Communities (ENREP). The ENREP record, which dates from 1980, exists both as a title only printed publication, and as an online database. Projects are indexed using a specially-developed multi-lingual thesaurus. Subject areas include environmental chemicals/pollutants, solid wastes and water. Each entry contains information such as research organisation, project title, start and finish dates, abstract and details of associated publications. Input from the EC Member States is provided by National Focal Points (in the case of the UK, a colleague of mine in the library) who collect information from domestic organisations. The database can be accessed via the EC's ECHO Host. At present telecommunications charges only are payable.

Information on local government research collected by the UK is also supplied to the Institute of Local Government Studies at the University of Birmingham. It is made available in their Register of Research. A significant number of projects are concerned with various aspects of environmental pollution.

Finally there is SIGLE (the System for Information on Grey Literature in Europe). SIGLE is an European Communities-wide attempt to deal with the gap in the knowledge and supply of 'grey literature'. This database became publicly available in 1984, and contains information dating from 1981. It is accessible via INKA and BLAISE-LINE. The UK input is provided by the British Library's database, British Reports, Translations and Theses. SIGLE's subject range is wide, covering science and technology, social sciences and humanities. Relevant areas for those looking for information on environmental pollution include agriculture, biology, chemistry, earth sciences and energy.

In conclusion, the services I have described may be divided into three categories not, however, mutually-exclusive, each with their own strengths and weaknesses.

- Databanks, e.g. IRPTC, UNEP Industry and Environment File and ECDIN
- Referral systems e.g. INFOTERRA and the OECD Switchboard
- Bibliographic systems and Registers of Research, e.g. ENREP and SIGLE.

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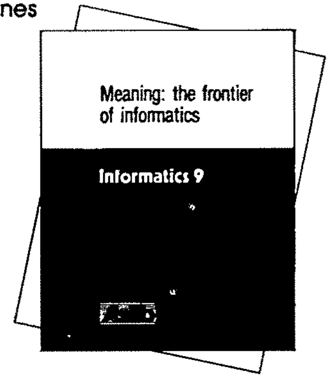

The challenging and thought-provoking proceedings of the ninth Aslib Informatics Conference are now available in published form. The conference was held in March 1987 at Kings College, Cambridge, under the sponsorship of Aslib – the Association for Information Management, the Aslib Informatics Group and the Information Retrieval Specialist Group of the British Computer Society.

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A directory of organisations within the UK which offer an online brokerage service. The directory includes information on availability, charges, speed of service, staffing, expected enquirer participation and back-up services (such as photocopying and loans). It also lists in each case the hosts accessed, the subject specialisations offered, and the availability of SDI services. There is an index to the services offered and a geographical index.

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Pamela Bater and Helen Parkinson

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- ★ patent classification systems
- ★ trademarks
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There is an excellent introductory commentary on the patent system.

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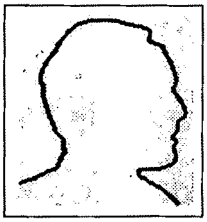

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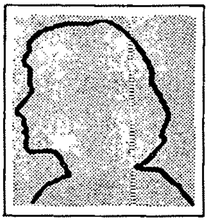

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Information services for industry and commerce in Northern Ireland

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This article is based on a British Library Research and Development funded project entitled 'Industrial, commercial and agricultural information in Northern Ireland: a survey of needs and provision,' October 1985–June 1987, by A. MacNabb, Dr G. Philip and Dr W.J. Martin, Department of Information Studies, The Queen's University of Belfast.

The British Library awarded the Department of Information Studies, The Queen's University of Belfast, funding to undertake a 21-month study of the information needs of, and information provision for, the industrial, commercial and agricultural sectors of Northern Ireland. The study was divided into two parts: part one concentrated on the industrial and commercial sectors, while part two was specifically concerned with information provision for the agricultural sector. The need for such a dichotomy became obvious at an early stage as the providers and consumers of the two sectors enjoy distinct identities. This article deals with the first part of the project – information provision for, and needs of, the industrial and commercial sectors in Northern Ireland[1].

Background to the project

Northern Ireland has, in the past, been rather neglected in studies of information provision. The CPI report *Information and the Small Manufacturing Firm*[2], although purporting to study the UK, does not include Northern Ireland. There are few related studies which examine Northern Ireland as an isolated region. These include one dissertation[3] and the Osola report[4]. The latter was *A critical review of industrial research and development support facilities in Northern Ireland* and was published in December 1983. Support in the form of information provision was only a small section of this report. The dissertation, on the other hand, is now out of date and probably due to lack of time and resources, covered only certain aspects of provision. Indeed one of the major providers, the Industrial Development Board, was just being set up at the time of the earlier studies.

Aslib Proceedings, 40 (7/8), July/August 1988, p.197–205. Printed in Great Britain.

Aims

The purpose of the research was threefold:

(i) To discover the extent and, within certain limits, the quality of information provision by libraries and information units in Northern Ireland, with emphasis on those services offering industrial and commercial information.
(ii) To discover the extent of the match between the actual provision of industrial and commercial information and the needs and demands of people working in these two sectors, and the nature and extent of mismatch.
(iii) To assess the potential for information provision, given the existing infrastructure, the present state and probable short-term future developments in the use of information technology, and taking into account attitudes on the part of librarians, information workers and information consumers.

The project team was aware of the problems of attempting a qualitative assessment of provision. The brief indicated that 'no generally applicable criteria of quality are intended and that the context is significant: in this case, the nature of the project and what would be accepted as everyday professional expectations of library and information services. Hence, quality can include such aspects as the range of services, opening hours, accessibility and user regulations.' The essential common denominator was seen to be the 'relationship between providers and users'.

Methodology

The project was divided into three stages:

Stage 1: Compiling a directory of libraries and information units;
Stage 2: Investigation of the type and range of information provision;
Stage 3: Survey of information consumers in the industrial and commercial sectors.

Stage 1

The first stage of the project involved identifying the relevant library and information units. Preliminary research showed that there was no single comprehensive directory of information services. The only directory trying to fill the gap is that compiled by the Action Resource Centre entitled *What's your problem?* The directory identified certain problems that someone starting out in business or someone already in business is likely to come across. Most of the information relates to grants although the new edition contains a list of sources of information. A directory of information services for industry and commerce was compiled during the course of this study (see Appendix).

Stage 2

The second stage of the project involved the gathering of data on the services provided by the libraries and information units listed in the directory. The brief indicated that a postal survey could be used with an additional interview survey of a stratified sample of providers. However, there were a number of problems with this approach and it soon became clear that it would be necessary to interview all the major providers. One of the main difficulties was the differing scale of information provision in each of the agencies and in the case of the government agencies, it was not confined to a single unit. There were also quite a significant number of enterprise agencies springing up to coincide with the boom in the small business sector. However, it was often the case that key personnel in these agencies moved on resulting in a collapse of the service either for good or for a short period.

In order to standardise interviews to some extent, an interview schedule was drawn up. The following areas were examined: (i) the facilities, (ii) the service, (iii) the users, (iv) co-operation with other information units, (v) location factors and their effect on the service if any, (vi) problems in the provision of the information service and, (vii) role in the future.

It was not possible to give a full evaluation of the service on the basis of a single interview with a key information provider. Statistics on use were asked for in each case, but were not always available and, in some cases, could be highly misleading. For example, the general public often enter Belfast Public Libraries' Business Library to simply read the papers or ask directions. The interviews brought such problems to light and proved to be a useful tool in gaining an insight into the service and its use.

Stage 3

The final stage of the survey was the survey of end-users of the information services. This was the most important, but also the most problematic stage of the study. The major problems were as follows:

(i) the extent and variety of information needs within the industrial and commercial sectors;
(ii) the wide variety of sources of information and options open to the users;
(iii) the problems in identifying a sampling frame as there is no one source listing all industrial and commercial companies with details such as number of employees;
(iv) choosing an appropriate research method that would ensure an adequate response without infringing too much on the valuable time of the business person;
(v) the problems involved in coping with firms whose size ranged from 1-2,500 employees.

The number of firms in the industrial and commercial sectors made it impossible to use interviews as the research method. It was decided that the questionnaire method would be the most appropriate, and a stratified sample of a third of the firms listed in the *Northern Ireland Trade Directory*[5] should be contacted. A further ten firms were selected for personal interview in order to make a more objective analysis of the quality of information provision in Northern Ireland.

The sample

As mentioned earlier, the sample was drawn from the *Northern Ireland Trade Directory.* The sample for the main survey was 1,068 firms or 30 per cent of the total listings of the *Trade Directory.* Retail outlets were not included. (The pilot was 0.30 per cent). The contents of the trade directory were analysed and distribution charts prepared. The sample was then stratified according to three variables: (i) type of industry (ii) location and (iii) size of firm.

Questionnaire design

The pilot survey tested whether it would be appropriate to categorise the problems a manager comes across over a given time span and ask him to list the agencies he used in trying to solve them and the difficulties (if any) he confronted. This approach did not work as there was no common definition of a problem. Most wrote that they did not have any problems over a three-year span. For those that did answer, the range of problems and the numerous contacts made to get information, although interesting, left any useful analysis impossible.

Having taken into account the findings of the pilot survey, it was decided to list the main information providers relevant to the survey, find out how often, if at all, firms have used them over a three-year period and examine a number of factors which affect the use of the services. The following factors were isolated:

(i) Awareness of provision – was the potential user aware of the existence of the provision?
(ii) Awareness of service – was the potential user aware of the services available and the circumstances in which they could be of use to the enquirer?
(iii) Evaluation of the information service – three dimensions were listed, and users were asked to rate it under these headings:

(a) up-to-date (b) easily available and (c) useful.

It was decided to include 'useful' as a final dimension because, although subjective, it will affect the users' perception of the service and perhaps will determine whether he uses it again.

Response

We received 372 completed questionnaires which gave us a response rate of 35 per cent. Two completed questionnaires arrived too late to be included in the survey.

Factors such as size, location, age and status of firms were recorded to examine whether they had any impact on the use of information services. Fifty-one per cent of the firms responding to the questionnaire had less than 26 employees and 30 per cent had a Belfast postal address.

The agencies listed in the questionnaire included government agencies, recognised university services, research establishments, enterprise agencies and public library services. In most cases, information provision is not the only function of the agency. The major agencies providing information to these sectors were the Local Enterprise Development Unit (LEDU), the Industrial Development Board (IDB), the Industrial Science Division (ISD), the Department of Economic Development (DED), and Lambeg Industrial Research Association (LIRA). Each of the above organisations has a business information service or a library but they vary in terms of size, stock, facilities and accessibility to the public. The Local Enterprise Development Unit has an innovation centre which stocks a wide selection of magazines and journals with the aim of providing ideas for new businesses. The Industrial Development Board has a Business Information Centre which many people were not aware of, while the library in the Department of Economic Development is not open to the public. The Lambeg Industrial Research Association is for members only and the library at the Industrial Science Division, although available for public use, is rarely used in this capacity. The largest collection of business information is found in Belfast Public Library's business library, although each of the other Education and Library Boards have their own separate services.

The two universities in Northern Ireland are becoming increasingly involved in providing expert services and research facilities to industry and commerce. In fact, the Queen's University of Belfast provides two services – QUBIS and QUBIS Ltd. QUBIS (Queen's University Business and Industrial Services) provides a very important advisory and technical service to industries in NI through four well-established industrial units whose full-time staff are employed solely on industrial work. QUBIS Ltd, on the other hand, is a limited liability company which was formed to commercially exploit the research and development being carried out at the University and also to make the University's resources more readily available to industry and commerce. The University of Ulster has an industrial unit and has recently founded the Northern Ireland Small Business Institute which runs short courses for those wishing to set up in business.

Evaluation of services

The survey found that there was a lack of awareness of many of the services provided by the agencies and, in some cases, a lack of awareness of the existence of some of the agencies. The results were analysed in terms of location, size of firm and status of firms. Although the agencies were for the most part located in the Belfast area, there were only slight regional differences in the firms use of agencies. However, a number of firms complained of the lack of resources in their own area. The north-west of the province seemed particularly badly served.

It was found that independent firms were less likely to use the agencies than those firms who were a subsidiary to a parent company outside Northern Ireland and those firms who were independent but had branches outside Northern Ireland. Status was therefore found to be a significant variable in the use of information services. While one might assume that independent firms have more need of information services than those which are subsidiary to a parent company outside Northern Ireland, it would seem that whether or not that need exists, they make less use of the services.

The survey found that medium-sized firms (100–250 employee range) had used more agencies than the smaller firms and the very large firms. Most of the very large firms had their own information services although few have in-house libraries.

Not surprisingly, the government agencies providing information on grants and finance were the most heavily used. They were also open to the heaviest criticism. Firms were particularly critical of the amount of irrelevant material that they were forced to plough through before finding out what they have asked for. Over a three year period, the Local Enterprise Development Unit was used by 104 of the 372 firms in the sample. At face value, this seems quite a large percentage, but further examination showed that 60 of these firms had used the service only once or twice. In contrast, the Industrial Development Board was used more regularly, 138 firms had used the IDB's services, the majority of them on more than nine occasions over a three-year period.

The services of the Department of Economic Development were used by 115 of the 372 firms in the sample. Twenty-nine firms used the services regularly, leaving it second to IDB as the most used agency.

Although the largest collection of business information in Northern Ireland is stocked in Belfast Public Library's business library, only 34 of the firms responding to the questionnaire had used the service. Further examination showed that over one third of these were regular users. This, coupled with the fact that many firms were unaware of the services of the business library, would suggest that if firms knew of the services, they would find them useful.

Gaps in information provision

The research also sought to identify gaps in information provision. The comments section of the questionnaire, when analysed, revealed that there were three main areas which business people thought were in need of improvement:

(i) Information specific to Northern Ireland that is sparse or non-existent, e.g. sales and marketing information which is rarely separated from UK trends.
(ii) Information that is too expensive for information providers to stock, i.e. many market research reports.
(iii) Areas of expertise that business people have found to be lacking in Northern Ireland, i.e. information on up-to-date technology and knowledge of exporting.

One businessman commented 'A definite dearth of market research specific to Northern Ireland exists: for instance in the area of consumer information, many national research agencies fail to include Northern Ireland in their 'national' sample. This gap is not adequately served by local companies/agencies and combined with a multitude of other sources and different types of information may confuse and disillusion industry. A focal point is required.

Business people also identified the need for information on local firms in more detail than that which appears in the *Northern Ireland Trade Directory*. It was felt that many opportunities for supporting local firms are lost through lack of information. It was suggested by a couple of business people that there should be an ideas bank on products that could be manufactured in Northern Ireland, especially those inventions and designs that could be of investment potential. As one businessman commented 'I feel there is something missing regarding new products and designs. All designers are looking for funding to get things off the ground and official sources are often slow and insufficient. Private investors should be able to obtain a list of new developments, new inventions, new designs etc. to make up their own mind if there is anything they like to invest in.'

This survey has shown that there is an urgent need for co-ordinating the various information services to prevent further time and money lost on the swings and roundabouts of information retrieval.

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5. *Industrial Development Board Northern Ireland Trade Directory 1985.* Belfast: IDB, 1985.

APPENDIX

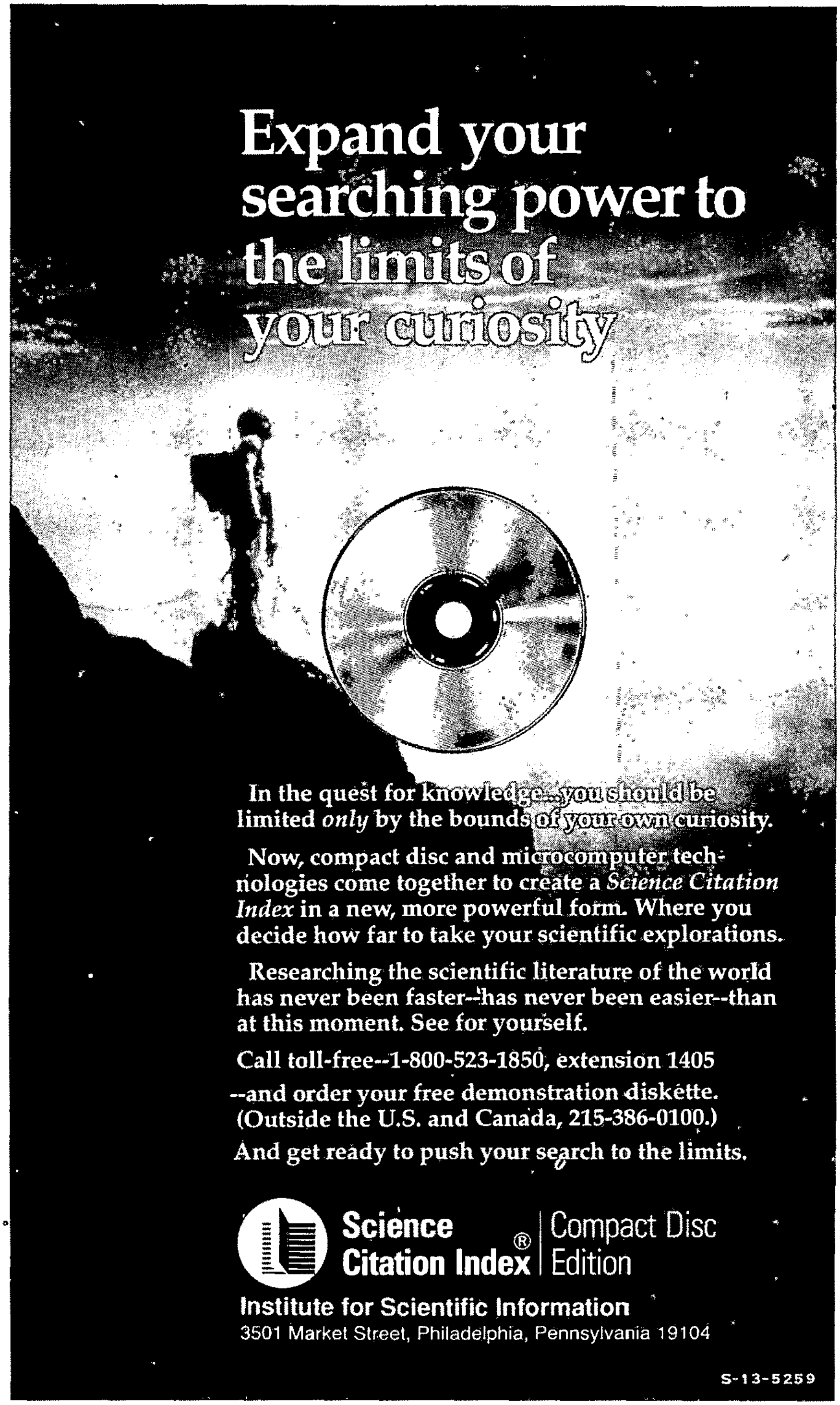
List of agencies providing information to existing businesses and those potential business people in Northern Ireland.

Industrial Development Board:	Tel: (0232) 233233
Business Information Centre	ext: 376
Marketing services	ext: 336
British Overseas Trade Board's Services for Exporters	ext: 317
New technology	ext: 415
Financial Assistance	ext: 234
Research and Development	ext: 270
Market Research	ext: 325
Local Enterprise Development Unit (Innovation Centre)	Tel: (0232) 691031
Central Business Library	Tel: (0232) 243253 ext: 266/218
Dept of Economic Development	Tel: (0232) 63244
Industrial Science Division	Tel: (08462) 5161
The Design Council, N. Ireland	Tel: (0232) 238452
EEC Information Office	Tel: (0232) 240708
Industrial Training Services	Tel: (0232) 681444
Labour Relations Agency	Tel: (0232) 221442
Equal Opportunities Commission	Tel: (0232) 242752
Fair Employment Agency for N. Ireland	Tel: (0232) 240020
Health and Safety Agency for N. Ireland	Tel: (0232) 243249
N.I. Chamber of Commerce and Industry	Tel: (0232) 244113
N.I. Chamber of Trade	Tel: (0232) 221980
N.I. Small Business Institute	Tel: (0231) 62220
Queen's University of Belfast, Information Services to Industry	Tel: (0232) 661111 ext: 4004
University of Ulster: Industrial Unit	Tel: (0232) 365131
Youth Business Initiative	Tel: (0261) 62220

Enterprise Agencies:

Action Resource Centre	Tel: (0232) 234504
Armagh Business Centre	Tel: (0861) 525050
Belfast Development Agency	Tel: (0232) 53260
Brookefield Business Centre	Tel: (0232) 755055
Business Advice Centre (L'derry)	Tel: (0504) 265817
Business Development Agency, Newry	Tel: (0693) 67011
Coalisland & District Dev. Organisation	Tel: (08687) 40467
Coleraine Enterprise Agency	Tel: (0265) 226558
Craigavon Industrial Development Org.	Tel: (0762) 41199

Ebrington Business Centre	Tel: (0504) 43885
Enterprise Carrickfergus Ltd.	Tel: (09603) 69528
Foyle Development Organisation	Tel: (0504) 264015
Job-space Ltd.	Tel: (0396) 4616
Larne Enterprise Development Co.	Tel: (0574) 70742
Lisburn Economic Development Organisation	Tel: (08462) 77791
Newry and Mourne Co-operative Society	Tel: (0693) 67013
North Belfast Community Resource Centre	Tel: (0232) 754513
North Down Development Organisation	Tel: (0247) 472525
North West Ulster Enterprise Agency	Tel: (0504) 265817
N.I. Independent Co-operative Agency	Tel: (0232) 232755
Omagh Enterprise Co Ltd.	Tel: (0662) 45321
Practical Action	Tel: (0232) 681447
Strabane Community Enterprise Trust	Tel: (0504) 882505
Strabane Industrial Development Co.	Tel: (0504) 882505
Workspace (Draperstown) Ltd.	Tel: (0648) 28113



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Keynote paper: the age of competition

Robert Heller

Paper presented at the 60th Aslib Annual Conference and Exhibition on 19–22 April 1988 at the East Midlands Conference Centre, University of Nottingham

There's no doubt that the information industry is the world's fastest growing: not only micros, software, workstations and databases but magazines, news-letter books, every form of printed and televised message. Desktop publishing threatens another surge forward. Technological revolutions never come about by accident – so what's the reason?

The answer is change. Whenever I'm asked to talk about tomorrow, I always say tomorrow is today. The most important factor of all is that change is upon us fast, much faster than ever before. The Great Crash of 1987 is highly symbolic – the film has been speeded up tremendously. IBM lagged by four years in EDP, two in PCs and came out on top. Today it can't afford a months's lag.

That highlights two aspects of change. The first is the need to keep abreast of rapidly changing technology in product and process. That has profound implications for the information business. Its part of the legendary thoroughness of the Japanese. The US and Europe have lagged behind.

There's a burning need for technological information of the non-technological manager, and for non-technological information of the technologist. The non-technological management of technology is decisive in the battle for markets, in both manufacturing and services (which are increasingly converging, anyway).

Battle is the word. It brings me to the second major aspect of change – competition: there's only one option now – success. Companies could once be unambitious, unplanned, ineffective and miss desired results in so far as they had any, and still be strong in their own territory. That's no longer possible in the naked market. (Figure 1).

The description is of the present not the future, and companies thrown into turmoil have included not only yesterday's giants (Dunlop), but today's (Apple). The latter was put under severe pressure by IBM, but now IBM itself is suffering from intense competition in both the PC and mini markets.

What went wrong at IBM? According to insiders, it's a case of slow responses, loss of contact with the market, management by lip-service, sluggish bureaucracy, matrix management and specific business errors – in other words, they didn't know what they were doing. The big organisation

Aslib Proceedings, **40** (7/8), July/August 1988, p.207–212. Printed in Great Britain.

The market is naked because there is...
1. Little protection from competition;
2. Great difficulty in protecting secrets;
3. Increased ease of entry;
4. Naked aggression in most markets.

That has been caused by...
1. Rapid technological change;
2. Saturation in a slowly growing world economy;
3. The abolition of geography;
4. Convergence between industries and companies;
5. The change from homogenous markets of need to segmented markets of desire.

Figure 1

needs to achieve flexibility and swiftness of response, which are the essence of competition – and if IBM, which probably was the best managed big business in the world, must change, all other companies must be in potential trouble. Needed change won't be achieved without a new look at organisations and hierarchies: my third major theme.

As in technology and competition, information has a crucial role to play in achieving better organisations. The virtue of hierarchy is that it solves a lot of problems at one blow – who gets paid most, who has authority, where the buck stops, who reports to who. As a means of obtaining the best results from people and organisations, it has long been obsolete, and is now positively dangerous. It also runs counter to the trend, which is the growth of autonomous, discrete units with a responsible boss in charge, headed by small, strategic central managements. The tendency is more marked in Britain than in Europe or the US, where it is slightly maverick, preached by people like Robert Townsend and Thomas J. Peters of In Search of Excellence. The latter's change of heart, however, is one sign that the maverick may well become the mainstream. Peters has now switched from praising big companies and praising largely internal 'attributes' to attacking big firms and praising the externally oriented, faster moving, flatter organisation.

Today's necessity really is to decentralise success, shifting the whole organisation away from interior towards exterior, and from the centre to the periphery. Achieving genuinely success for a genuine autonomous business, which has genuine resources at its genuine command, rests heavily on the provision of excellent information to combine control with freedom.

It's impossible to run the flat, fast company without superb information systems. A study of successful companies and failures in the same industry showed that the successes, among other things, knew far more about their

Define business *objectives* & operate to meet them.
Identify *market* opportunities & concentrate efforts to achieve planned business results.
Have a clear understanding of *money* & its use as a company resource.
Have good *information* systems in support of good decision-making procedures.
Organise management to operate as a *team* – developing and training executives.

OMMIT

Figure 2

markets – they had to, because they specialised by either product or type of customer, and they followed a highly information-intensive philosophy: OMMIT. (Figure 2)

The five OMMIT policies rest on the possession and effective use of information. The issue goes beyond that. The essence of success in competitive times is comparison – for instance, the lowest cost producer is King. How do you know if you are lowest cost? You have to find out. Such questions were crucial in the recovery from the severe British recession, in which manufacturing output fell by 20 per cent. Rationalising product ranges and production, lowering costs, achieving world-class standards and world markets, and getting a strong position in those markets meant answering these questions: (Figure 3)

1. Are we selling the right things?
2. Are we producing in the most effective way?
3. And at the lowest cost?
4. Are we as good as or better than our best competitor?
5. Are we tapping the widest possible market?
6. Do we have an edge – a unique selling proposition?

Figure 3

Answering questions is the key to knowledge, which is information. That statement has enormous relevance to the fourth theme, one of major significance: competing with Japan. European companies must learn from Japanese strengths and learn how to combine them with the stronger European traditions of independent thought and action. The Japanese strengths include: 1) the adaptable manager, deeply informed, whatever his specialism, about all aspects of the business 2) the separation of responsibility from seniority 3) PCP – persistence, commitment and professionalism 4) the indefatigable pursuit of knowledge, from market facts to the latest variations in the techniques of statistical quantity control.

All these things are well-known in the West, and everything that's applied in Japan can be found in the West – somewhere. But it's not applied consistently or comprehensively enough. We can't compete with the best in the world unless the idea becomes established that the company must be all of one cloth, in which marketing, manufacture, finance, R & D, personnel, and, of course, information are all bound together – and the binding is information. This is what comprehensiveness means to a good Japanese company: (Figure 4)

1. Maximise current overall Return on Sales;
2. Use short-term profits to finance long-term strengthening of the business;
3. Build decision-taking round strong central leadership;
4. Make getting the best out of people, and doing the most for them, a central preoccupation;
5. And the same goes for getting the best out of money;
6. Get all production, financial, marketing (etc) procedures to maximum efficiency;
7. Make beating the competition a constant objective.

Figure 4

All of this places tremendous demands on the manager of tomorrow. He or she has got to be mobile, but loyal: specialised but generalist: innovative but conservative: fast-reacting but solid: self-actualising but true to the company: able to breakaway, but content to stay. That's the fifth theme – the manager who must be performance oriented, able and eager to take total responsibility, highly versed in specific markets, flexible, competitive personally and in his or her corporate role, innovative, a gifted manipulator of men and women and . . . superbly informed. How else can the manager understand the complex management issues of a day when there aren't too many simple ones? If you're going to succeed, you're going to have to compete, innovate, think big, lead the market, be professional and change – above all. That demands being able to answer questions like these: (Figures 5 and 6)

This talk could just as well have been called 'The age of complexity'. To deal with complexity, the essential equipment of the paragon manager includes knowing what information he wants, how he wants it, where he wants it, when he wants it – and part of the essential task of the information

Compete
Do you know your sales as a proportion of those of your three key competitors?
. . . how that ratio has changed over the past year?
. . . how you are going to increase it this year – & next?

Market
Do you know (not think) what customers think of you & your products & services in relation to the competition?
. . . if you don't, will you take steps to find out?

Think big
Do you have plans for (A). Existing businesses & (B). New ones that will, if successful, have a radical effect on profits?

Professional
Have you been through two forms of useful training in the past 12 months?
. . . have you read any books or articles on management?
. . . have you mastered the PC?

Figure 5

Innovate
In the past year have you been involved with an *important* innovation. . .
A. In internal procedures or processes?
B. In products or services offered to the public?
. . . will there be any in the next year?

Defend your base
Are you convinced – by facts – that in your staple business you are equal to or better than the best on all key aspects?
. . . if not, do you have plans to raise yourself to the best standards?

Change
Have you in the last 12 months looked at any important aspect of the operation with a critical eye – and if you found defects, have you instituted reforms?

Figure 6

supplier is to meet the manager more than half-way – in the interests of an overriding purpose. That is expressed in an observation by Peter Drucker: that knowing what to do in management is easy: it's doing it that's hard. The overwhelming objective of the information manager in the age of complex competition must be to give management the easy knowledge, and to make the hard task of turning it into action easier as well.

There is evidence that the four horsemen of Britain's relative economic decline are now in retreat. Insularity, smugness and idleness are the first three; the fourth is ignorance. By dispelling that and replacing it with information, you can help ensure that the four horsemen never ride again.

Doomsday or resurrection – professional information management and the management of information professionals

John Wales

Paper presented at the 60th Aslib Annual Conference and Exhibition on 19–22 April 1988 at the East Midlands Conference Centre, University of Nottingham

Historical background

It is now nearly a decade since the current Director of Aslib rocked the somewhat complacent debating chambers of the information profession with his paper 'There won't be an information profession in 2000 AD'[1]. At the time, the IT world was developing a view of the paperless office brought about by heady dreams of electronic libraries, common networks and end-user searching. The day of the intermediary was drawing to a close, or was it? With the passage of time, experience brings with it a realisation that nothing is black and white, but a rich texture of shades of grey. As we enter the 'Information age', those with the capability to exploit information effectively will be the winners. The advice 'to change or be changed'[2] was never more apt than it is today.

The task

In order to exploit information effectively, an organisation has to adopt a strategic approach to what we call information management. There are many definitions of this concept but one way to illustrate its dynamic nature is shown in Figure 1.

The activity in capitals is not a typographical error; this is where effectiveness can be measured. The end-user is interested in one input — 'Decision support' and one output — 'Purposeful action'. Timely and appropriate action in response to external stimuli is the overall goal.

Information processing is not an end in itself; it is a costly activity mitigated by the benefits arising from effective exploitation of the information being managed. It is for this reason that information networked through an organisation is so valuable in that the unit cost of information processing is dramatically reduced. In addition, the knowledge base of the organisation can enjoy substantial synergy not only in an appreciation of its environment but also in establishing a high degree of teamwork.

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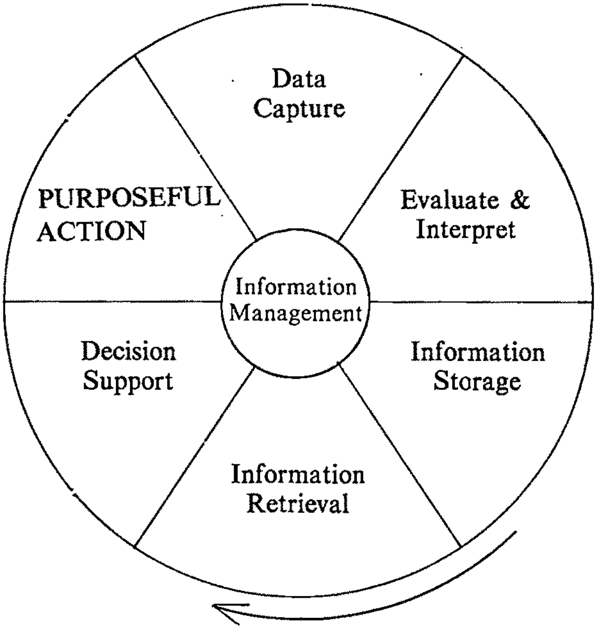

FIGURE 1

The information professional
Labels such as librarian, information scientist, archivist, records management practitioner are becoming less important than the maintenance of overall standards of professionalism in information management. Over the last five years, considerable resource has been invested in the 'T' of IT and a comparatively small amount in 'I'. The successful organisation achieves a working partnership between the two. There is now apparent a growing realisation that the considerable investment in IT will derive its benefits from more effective information management.[3]

Different skills are needed to be a fully effective information professional. The debate between end-users and intermediaries is once again too simplistic a view. Perhaps the intermediary should be born again as a facilitator. In industry, we would see today's information professional having an objective such as:

> 'To enable the business to establish and maintain competitive advantage by the cost-effective exploitation of both external (published) and internal information (by end-users)'.

This is much more demanding than simply responding to demands placed on the librarian, online searcher, etc. It requires effective teamwork between several disciplines involved in IT in its broadest sense. Those who do not adapt to this new challenge will increasingly find themselves with inadequate resources as the balance swings towards those who are seen to be directly contributing to business success.

The team approach

Maintaining a professional approach to information management is very similar to running a successful business. Three key functions have to be maintained in balance:

1) production;
2) sales;
3) research & development.

Each of these requires an increasing degree of partnership, namely:

Production – the maintenance of current, relevant services. Close collaboration with both users and suppliers is essential if this is to remain a highly valued support – the alternative is obsolescence.

Sales – continuous attention to the needs of the user community is increasingly essential. Nobody owes anybody a living in a competitive environment. There is a greater requirement to promote services and attract new customers although practitioners have a fear of causing an unsustainable increase in demand for information services. This is an admission that current needs are not being adequately met. New users very often bring with them the case for better resourcing.

Research & development – 'inadequately resourced' information services invariably sacrifice this function in order to survive with current services, yet the development of new services, technologies, methods are essential to remain ahead of the game. This is just the opposite of the way a business concern reacts – research is the lifeblood of a long-term competitive business.

The information management practitioner

The growth in IT facilities for end-users is already resulting in many having access to external information services which were previously the province of the intermediary. Experience in end-user training is that the potential of online is not fully appreciated. With current technology there remains an area of information searching which is too technically demanding for the casual user. An example is comprehensive patent searching where a deep knowledge of the indexing terms may be necessary.

As technology develops further, the intermediary niche will inexorably occupy a smaller proportion of information requirements. The role of the librarian/information scientist will continue to be one of enabling users to take advantage of the information they require by:

1) encouraging the use of published information by promotion of services and training of users;
2) carrying out specialised enquiries;
3) continuously evaluating and establishing new methods, facilities, sources as well as influencing users to adopt those appropriate to their requirements.

Successful practitioners will need to be responsive to changing user requirements but will become highly valued professionals. Those who fail to make the necessary role change will indeed become obsolete as the user community becomes more IT proficient. The choice lies in the hands of today's information professionals whether in information units/libraries or already becoming established in the user community.

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Value chains, pogo sticks and competitive edge

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Paper presented at the 60th Aslib Annual Conference and Exhibition on 19–22 April 1988 at the East Midlands Conference Centre, University of Nottingham

Pogo ergo sum

A pogo stick puts spring in your heels. It takes you hip-hop-hopping past the foot trekkers. Information technology (IT) is the executive's pogo stick: with it you skip ahead of your rivals and leave the competition for dead. Would that life were so simple . . . that one-upmanship were so easily achieved. The copywriters' inflated rhetoric promises a great deal. When you buy system XYZ you are also getting in-built competitive advantage. White rabbits out of hats. Sometimes there is no rabbit; sometimes it's not white; sometimes it's a mutant; sometimes there's no rabbit, just a lot of droppings. But the copywriters ignore reality. Gaining and sustaining competitive edge may not be as easy as ABC, but it's no more difficult than bouncing along on a pogo stick. Just make your cheque payable to XYZ Inc. . .

Value chaining

What is a value chain and what has it got to do with the notion of competitive advantage? 'The value chain disaggregates a firm into its strategically relevant activities in order to understand the behaviour of costs and the existing and potential sources of differentiation. A firm gains competitive advantage by performing these strategically important activities more cheaply or better than its competitors'[1]. The principal generic elements of the value chain are shown in Figure 1.

The value chain concept works better with some businesses than others, for example, in manufacturing industry where the links in the chain are tangible. However, we have tried to show that the concept can be applied with benefit to non-commercial organisations[2]. Our three-tiered value chain describing the strategic operations of a university is shown in Figure 2. The decomposition of a 'business' into its constituent activities can highlight the main cost drivers, the quality and efficacy of the links in the chain and provide comparative cost/performance data. This, according to Parker and Benson[3], leads to improvements in value linking (the ripple or

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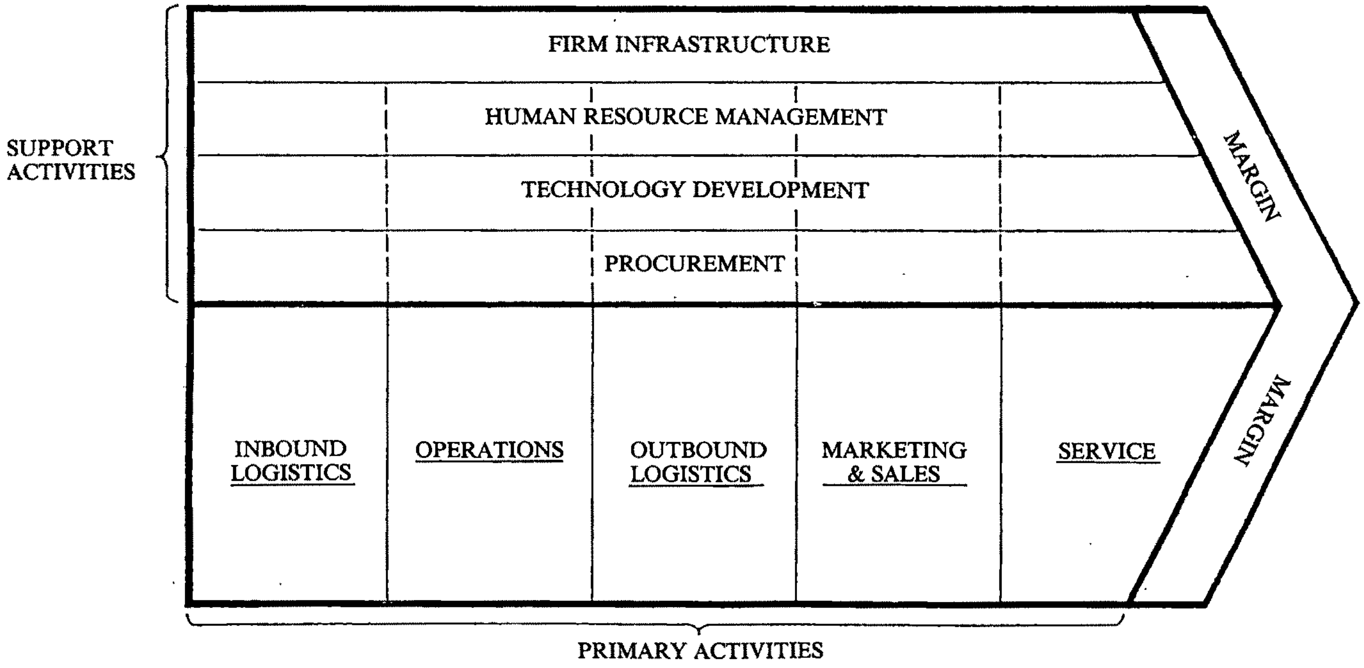
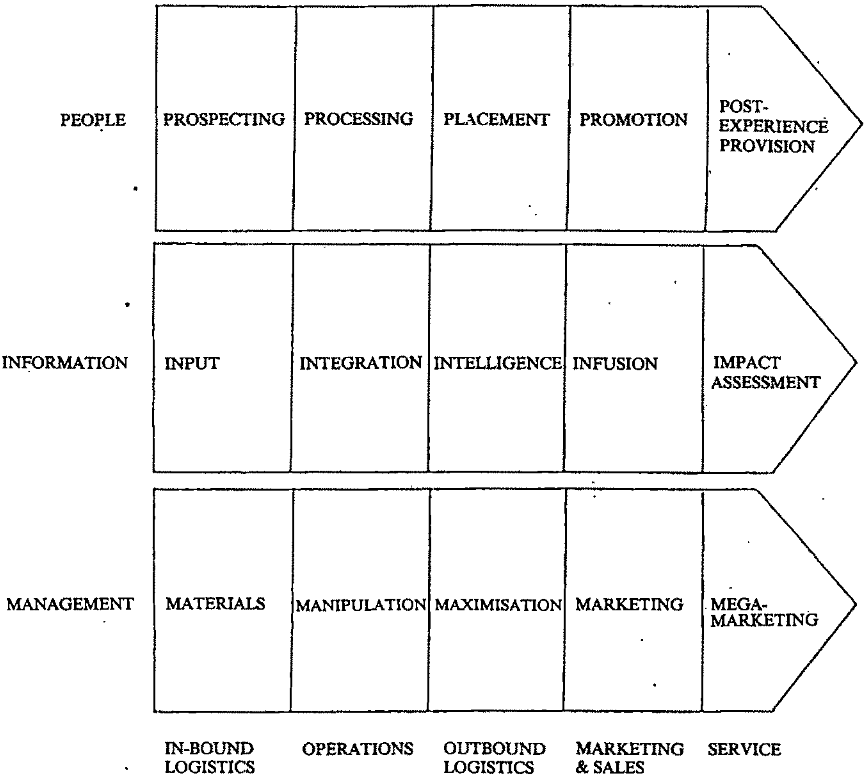


FIGURE 1. *The generic value chain* (Source: Ref 1. p.37).



	IN-BOUND LOGISTICS	OPERATIONS	OUTBOUND LOGISTICS	MARKETING & SALES	SERVICE
PEOPLE	PROSPECTING	PROCESSING	PLACEMENT	PROMOTION	POST-EXPERIENCE PROVISION
INFORMATION	INPUT	INTEGRATION	INTELLIGENCE	INFUSION	IMPACT ASSESSMENT
MANAGEMENT	MATERIALS	MANIPULATION	MAXIMISATION	MARKETING	MEGA-MARKETING

FIGURE 2. *The university value chain – PIM model* (Source: Ref 2. p.86).

knock-on effect), value acceleration (more immediate impact on bottom-line performance) and value restructuring (deploying staff on higher-value activities).

Competitive edge

The leverage effect of IT will vary according to the industrial sector: much depends on the information intensity of the finished goods and the production processes (Figure 3). Some products (and services) consist primarily of information and some have a high level of embedded information processing capability; others are the result of a complex production process which depends on the assimilation and co-ordination of a large volume of information[4]. The higher the overall information intensity of a business, the greater the potential for value chain manipulation. The real opportunities lie in the upper right hand quadrant of the matrix in Figure 3.

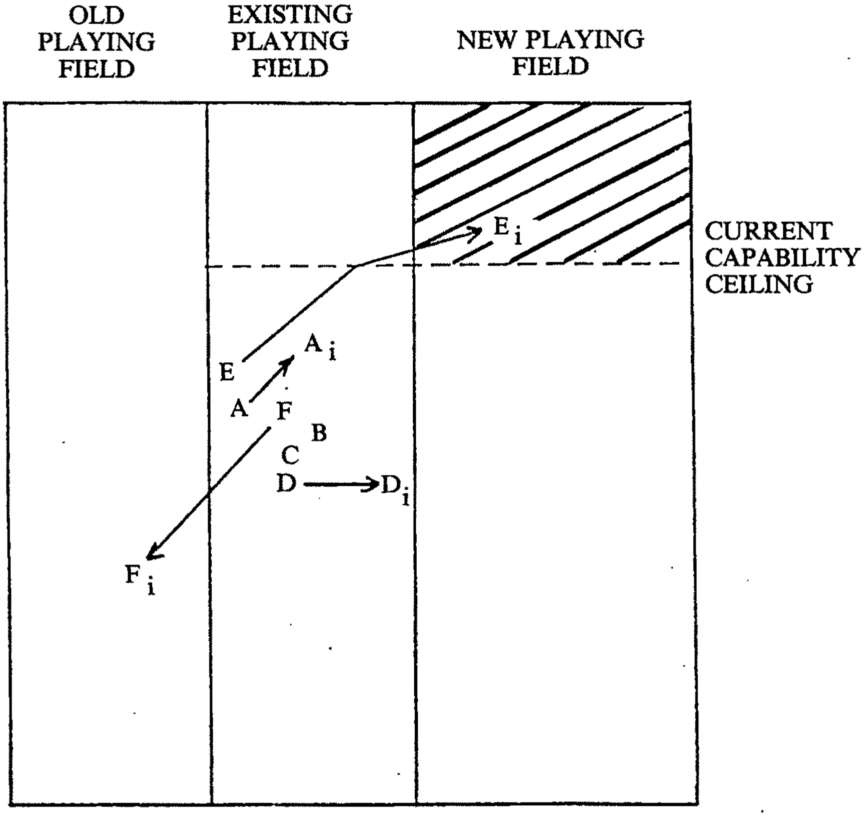
		Information content of the product	
		LOW	HIGH
Information Intensity of the Value Chain	HIGH	Oil refining	Banking Newspapers Airlines
	LOW	Cement manufacturing	

FIGURE 3. *Information intensity matrix* (Source: Ref 4. p.100).

Competitive edge can be gained in a number of ways: by improving quality; by cutting costs; by increasing market share; by raising entry level barriers; by locking in customers. The key to success is effective differentiation. And that's where IT comes into play. Figure 4 shows four outcome sets involving six players experimenting with IT. Company A moves from a laggard's position to catch up with the majority; D uses IT to pull ahead of the pack; E exploits IT to leapfrog the competition and catapult itself from the existing playing field to the elysian heights (in the process rewriting the rules of the game); F somehow bungles its investment and falls further behind in the performance stakes, while companies B and C fail to lever any apparent advantage out of their investments.

A real world example of 'catch up' is McKesson's aping of American Hospital Supply's online ordering facility; Fritotag's equipping of its salesforce with hand-held terminals is an example of 'pull ahead' in the snackfood business; Thomson's viewdata system (TOPS) illustrates how IT can be used to leapfrog the ruck in the package holiday market, and Bank of America's $85m Masternet system write-off is a good example of 'fall behind'. For obvious reasons, the success stories are easier to unearth[5] and more loudly trumpeted by purveyors of pogo sticks.

The benefits produced by the three strikes mentioned above (catch up, pull ahead, leapfrog) are often qualitatively and quantitatively different. Catch up can be equated with efficiency gains; pull-ahead with improved organisational effectiveness and leapfrogging with added value (in exceptional cases leapfrogging results in the transformation of an industry).



A – A_i = CATCH UP
D – D_i = PULL AHEAD
E – E_i = LEAPFROG
F – F_i = FALL BEHIND

FIGURE 4. *Turbocharging with IT.*

Pogo sticking is deceptively simple, but in reality is something of an art requiring good motor co-ordination and balance. And so with IT. There is, then, something missing from the title of this paper: a reference to that *je ne sais quoi* which distinguishes the successful leapfrogger from the mere catch up artist. The title should have read *Value chains, pogo sticks, competitive edge and the 'aha' factor.*

The 'aha' factor

Let us ignore Wittgenstein's admonition that 'whereof one cannot speak, thereof one must be silent' and reflect on the 'aha' factor. It's the ineffable element in the equation; one which can overturn expectations and reconfigure the playing field. Purica[6] has sought to explain creativity and 'ahaness' in the terms of a cusp catastrophe by constructing a geometric model of the creative jump (Figure 5) which describes the emergence of a new theory or paradigm. He suggests three regions in the scientific research effort corresponding to (a) the progressive discovery of new empirical laws, (b) a qualitative transformation following a quantitative accumulation (emergence of the new theory) and (c) the application of the new theory to generate a fresh or revised set of empirical laws.

In his model, it's the 'aha' factor which (literally) raises the level of knowledge to a higher plane. The 'aha' factor brings about a quantum-level (as opposed to incremental) change in understanding. Harking back to what I said earlier, it's the difference between leapfrogging and catching up or pulling ahead with IT. Purica in fact talks of 'ahaness' as marking

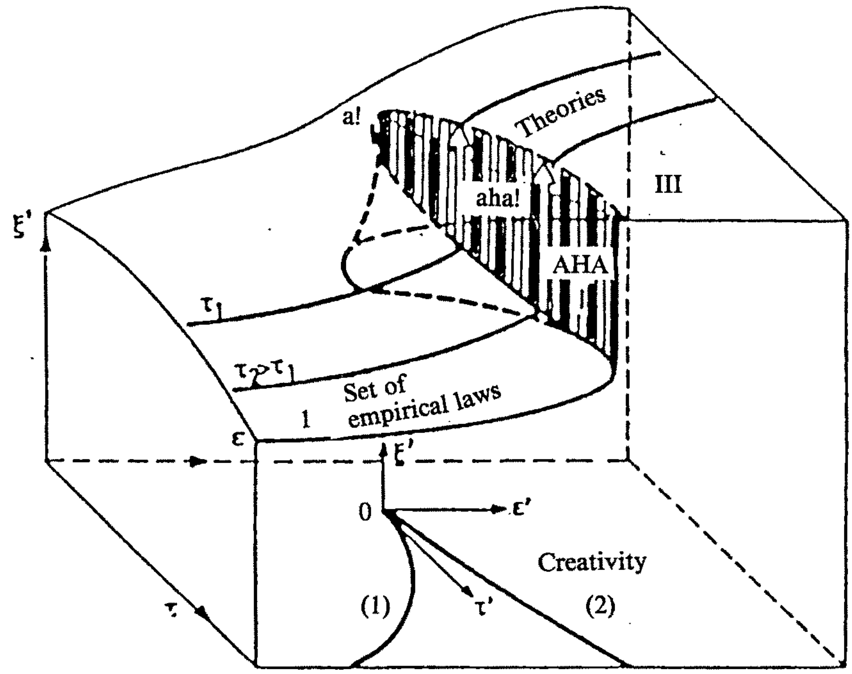


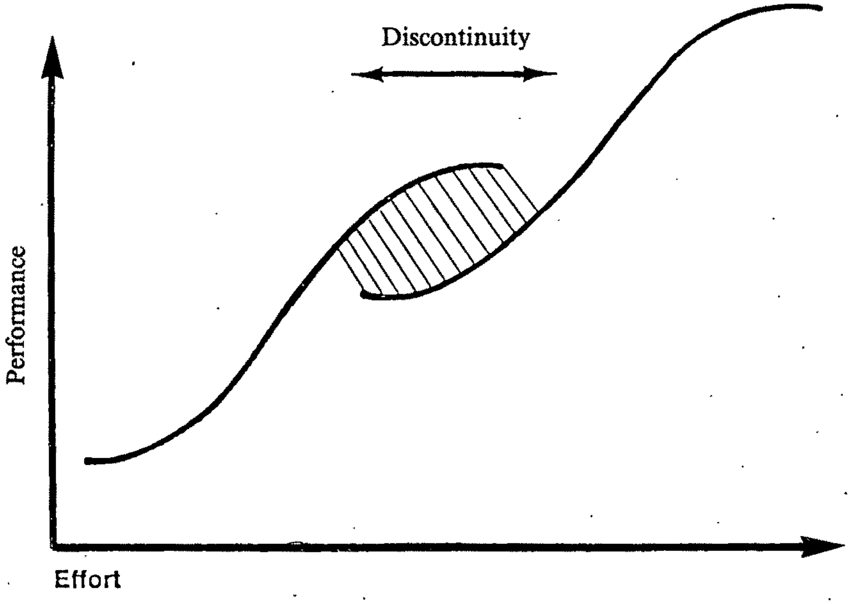
FIGURE 5. *The Cusp catastrophe as a model for creativity* (Source: Ref 6. p.21).

'a discontinuity between two different types of activities' (intelligent activity and creative activity).

The S-curve

Purica's reference to 'discontinuity' brings to mind the way in which the S-curve can be used to manage innovation and confer 'attacker's advantage'. The S-curve 'is a graph of the relationship between the effort put into improving a product or process and the results one gets back from that investment'[7]. It's a simple yet powerful means of plotting limits and giving a company early warning of the need to come up with replacement products. However, S-curves tend to appear in pairs (Figure 6). The point at which one technology (or technological process) approaches obsolescence and a replacement emerges is defined as a 'discontinuity'. This transitional phase is to some extent analagous with Purica's 'creative jump'.

Using S-curves, a company can estimate the extent to which a particular technology has matured and the probability of a successor appearing on



S-curves almost always appear in pairs.
Together they represent a discontinuity–when one technology replaces another.

FIGURE 6. *An S-curve* (Source: Ref 7. p.102).

the horizon. The technique can be used by a company to guide acquisition, divestment, innovation, capital investment, pricing or R&D strategies. It can be applied to a particular technology marketed by a company (what is its life expectancy?) or to the infrastructural technologies used by a firm to carry out its routine operations (what mix of technologies would positively impact the value chain?).

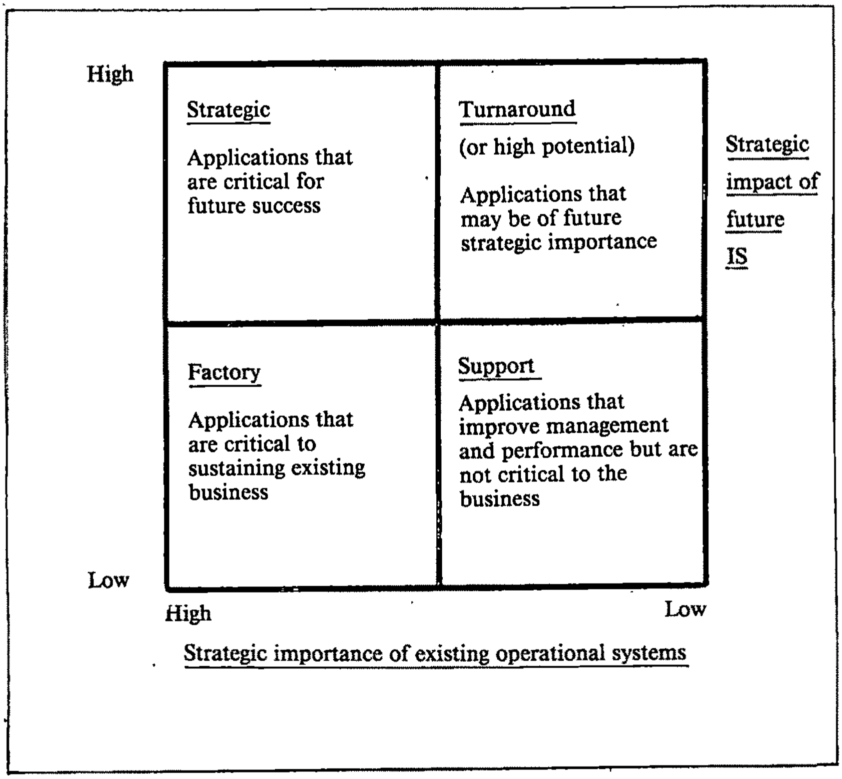
Consider the two S-curves in Figure 6 as describing the demise of electro-mechanical cash registers and the rise of the electronic register. Success is defined as the ability to manage the transition from one curve (or generation of machine) to the next before a new entrant can muscle in on the market with a replacement product. How a company navigates this zone of discontinuity will determine whether it pulls ahead or falls behind. Competitive edge is sustained by the preemptive strike; by making a smooth and timely transition from first to second generation product. The exploitation of IT to refine existing products, improve quality control, rationalise distribution, contain overheads, accelerate innovation, or whatever, is a means of springing from one curve to the next and thus maintaining pressure on existing (and potential) competitors.

The S-curve is not in itself a guarantee of success. 'Tailfin' updates may not be enough to keep the competition at bay. CD-I and digital paper are breakthrough (not tailfin) products, which have to some extent altered the rules of the game as far as high density information storage is concerned. Industry watchers using the S-curve might indeed have predicted the emergence of new wave products, but without being able to specify their novel features. The S-curve can indicate that something needs to be done, but it won't tell you what has to be done. That's the domain of the 'aha' factor.

Systems and strategy

Companies B and C in Figure 4 gained no relative advantage as a result of their investments in IT. They failed to pogo. The reason could have been that they focussed on applications of low strategic importance. Ward's matrix (Figure 7) points out the nature of the relationship between business performance and information technology[8]. Four generic types of systems are indentified: strategic, turnaround, factory and support. Factory and support systems contribute to existing business performance, but have little strategic leverage. Turnaround and strategic systems are likely to have a major impact on a corporation's long-run business performance and competitive posture. Turbocharging, in other words, is most likely to take place in the upper left hand quadrant.

Figure 8 is a variant on the previous matrix and is used by Synnott[9] to illustrate possible CIO (Chief Information Officer) and CEO (Chief Executive Officer) perspectives on the application of IT. Quadrant 1 is where corporate management and information management share a vision of what IT means in strategic terms to the organisation. A shared vision is also in evidence in quadrant 4, where both parties see IT as a support



Strategic impact of future IS	High	Low
High	Strategic Applications that are critical for future success	Turnaround (or high potential) Applications that may be of future strategic importance
Low	Factory Applications that are critical to sustaining existing business	Support Applications that improve management and performance but are not critical to the business

Strategic importance of existing operational systems

FIGURE 7. *Current and future IS strategic importance matrix* (Source: Ref 8. p.155).

facility. Divergent views are to be found in quadrants 2 and 3, which is likely to result in frustration and resource misallocation. The message from Figures 7 and 8 should be clear: different pogo sticks for different patches.

The jury's still out

The opinions and the evidence are conflicting. Case histories can be marshalled to show that IT does create competitive edge. Equally, tales of woe can be recited to show that the reverse is true. But what do we do if we want to demonstrate the general relationship between, say, a company's market share and its return on investment (ROI), the link between product quality, market share and profitability, or the relationship between unionisation and profitability? Answer. Turn to the PIMS (Profit Impact of Market Strategy) database, which will provide us with models of the kind shown in Figures 9 and 10[10]. It's not so simple with IT. We lack at

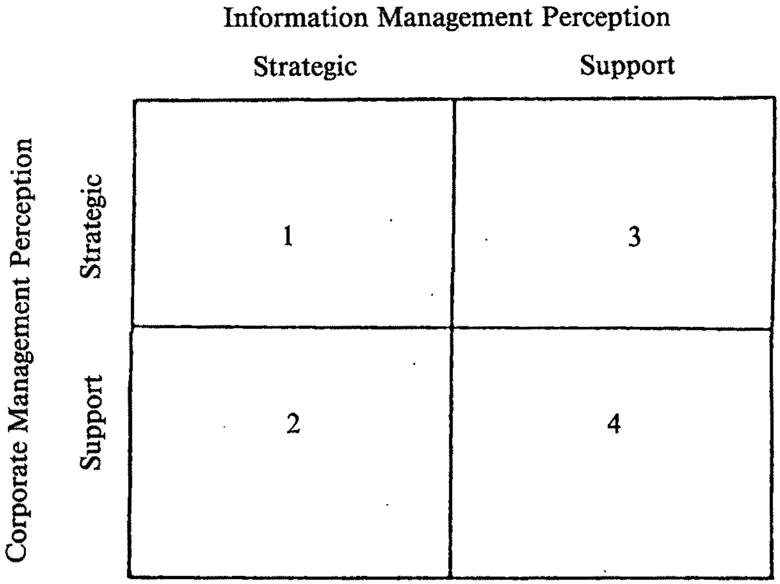
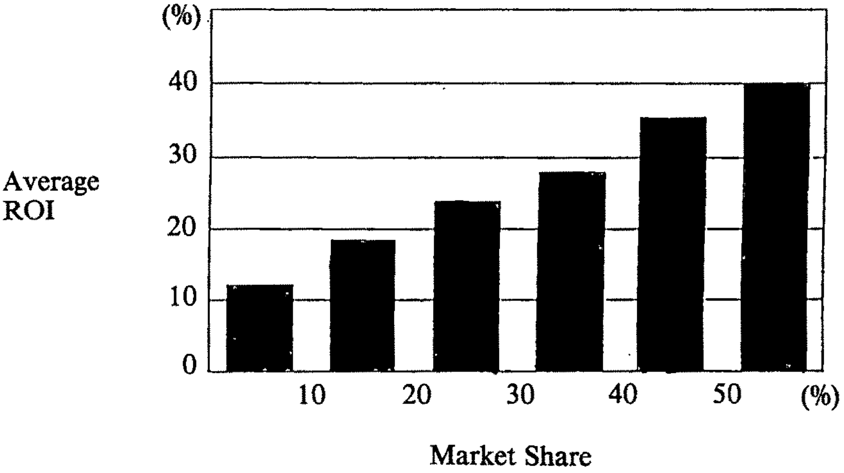

Information Management Perception
Strategic
Support
Corporate Management Perception
Strategic
Support
1
3
2
4

FIGURE 8. (Source: Ref 9. p.53).



Market Share and ROI

NOTE: Based on 4-year averages of pretax, pre-interest ROI for 2,611 business units in the PIMS database.

FIGURE 9. *Market strategy and ROI* (Source: Ref 10. p.9).

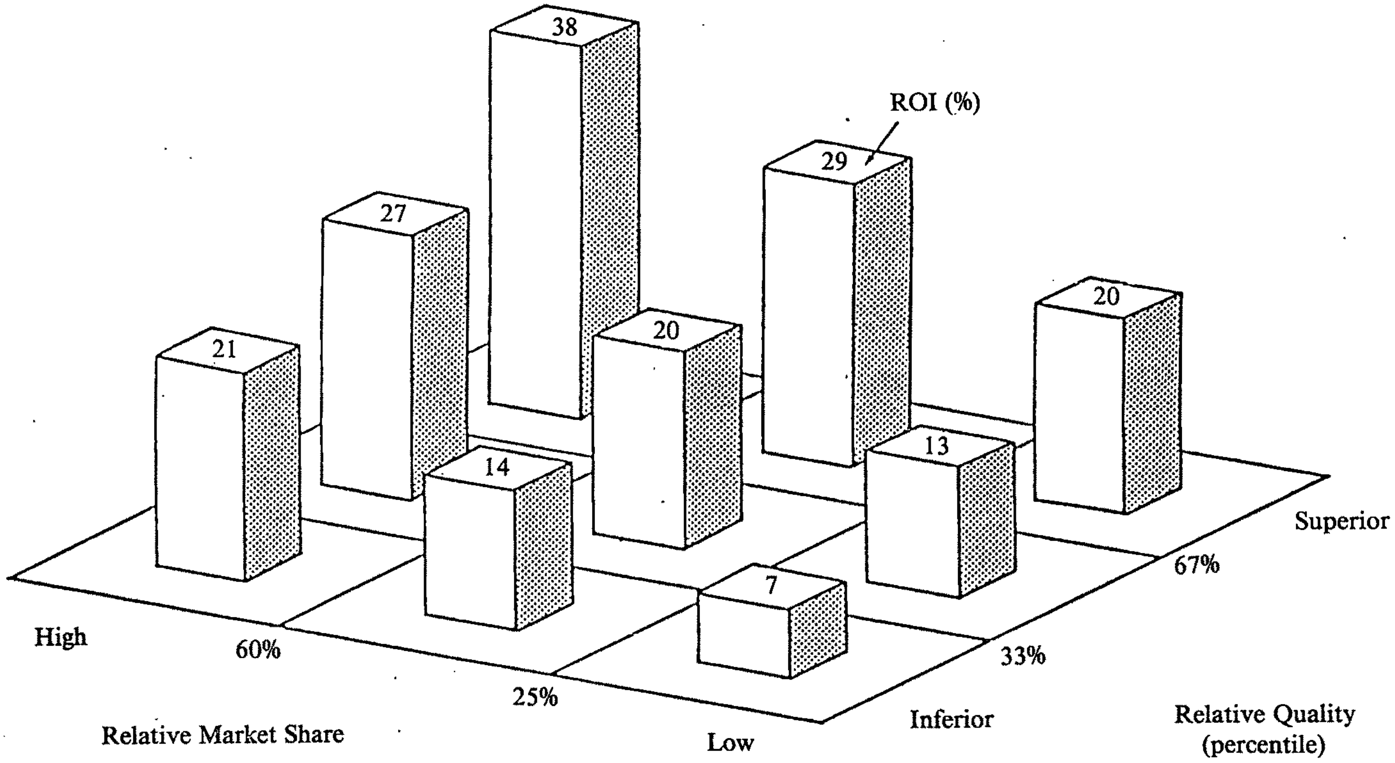


FIGURE 10. *Quality and share both drive profitability* (Source: Ref 10. p.109).

present adequate longitudinal, multi-firm data to allow us to determine the general relationship between IT investment and overall business performance. In the meantime, we can but pogo and pray.

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NEW BOOKS

Informatics 9

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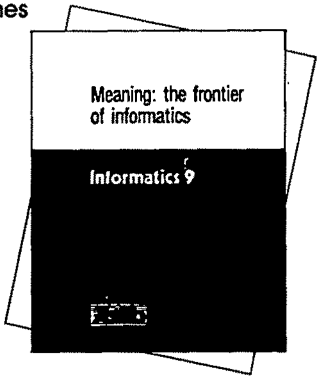

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ASLIB PROCEEDINGS

Volume 40 **SEPTEMBER 1988** **Number 9**

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Keynote paper: the politics of information

Michael Ivens

Paper presented at the 60th Aslib Annual Conference and Exhibition on 19-22 April 1988 at the East Midlands Conference Centre, University of Nottingham.

I am going to talk about 'the politics of information', which is not the same thing as 'information of politics', but they are often related. This paper is seen from the perspective of a campaigning organisation — Aims of Industry — which is concerned with industry and business and its political issues.

Aims of Industry was set up in 1942, and put on ice when a number of prescient industrialists came to the conclusion that there would be a substantial movement after the war for the nationalisation and state ownership of industry. Aims of Industry was given the task of putting the case for free enterprise. It is supported by over 1,000 companies, and 10 federations and associations representing 35,000 companies.

Many companies fear involvement with politics. Their approach is rather like that outlined by Levy-Bruhl: 'When bananas first appeared in Kasenga, we offered one to the Chief. He refused it with horror. "No, no, I have never seen such fruit before. It is 'tonda'. That is to say, if I touch this extraordinary fruit, it will exercise some sinister influence on me, bring me bad luck or bewitch me." ' And yet the rare companies who have taken a strong political line have usually been left alone thereafter. For example, Tate and Lyle and the Cube campaign. Regrettably, he who gets slapped is often the pacifist.

Nevertheless, there is sometimes a genuine basis to industrialists' fears that if they expose their hand politically they may lose contracts from Government, local government and nationalised industries. The danger these days is particularly from local authorities. For example, the GLC attempted to frighten industry away from supporting Aims of Industry by threatening to remove contracts. Some companies are also afraid of trade union action. And so companies may find it useful to shelter behind organisations in providing political information. However, some companies are too prone to do this and to excuse themselves by the dictum of 'low profile'.

The whole training of managers militates against confidence in handling political information when they reach the top of the organisation. As one chairman put it to me: 'As a middle and upper manager I was told to keep my political nose clean. When I became chairman of the company I had to realise that there was a direct relationship between the success of my company, the employment of my workers and Government policies. And so I decided to speak out. But it was all against my early training.'

It is obvious that one should give political information to those who can most help you.

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a) In these days it may be the Prime Minister or members of the Number Ten Policy Unit.
b) It will also be Secretaries of State or the relevant Ministers. Sometimes the relevant Civil Servant. Ministers change often and one must face the wearisome task of starting all over again.
c) The media — in order to influence politicians.
d) In the case of both Houses of Parliament, different approaches are needed. As Lord Kagan put it, it is rape in the House of Commons and persuasion in the House of Lords. The age of present peers produces some information problems.

Parliamentary privilege is an important issue when it comes to open information. Members of Parliament cannot be taken to court for slander for anything they say while on Parliamentary business. On the other hand it is possible to sue them if they utter a slander in a private room of the House of Commons or the House of Lords.

Parliamentary privilege can be valuable in helping to bypass nervous editors. For example, when editors felt inhibited about mentioning that certain politicians may have been over-helpful to Czech intelligence in London, their position became bolder when it was raised in the House of Commons.

Members of Parliament who can be very bold in saying things in the House of Commons that they would not dare say outside of it, can be very sensitive about their own privileges being allegedly threatened. If you are summoned to the Committee of Privileges and found guilty, your choice is to appear before the Member of the House and apologise, or go to prison until you have expunged your guilt. My choice when threatened with the Committee of Privileges by Mr Tony Benn, was to state that I would take my chess set to prison and refuse to apologise. In the end an all party committee found unanimously in my favour so I never became a martyr! As a campaigner, I have sometimes found it useful to deal with old political maxims by standing them on their head. Or by accepting them full on — or finally by subjecting them to fundamental questioning. Another important strategy is, providing you have a good case, to open up an information debate. Often the opposition will be lured into replying if they see you are making the running.

In politics as well as in industry it is important to spot the communication ditches. One of the most important ditches is often one below top level: in other words, just below the board or the Prime Minister. Thus, Harold Macmillan appeared to be oblivious of the absolute buzz of information about the Profumo case. Subordinates sometimes feel that dictators and company directors cannot stand too much reality and hold back the ugly problems. The result can be rifle butts banging at the dictator's door or, in the case of a company, a large strike or a departure of vital managers.

Where we do need change is on policies on political information as far as broadcasting is concerned. Here the Independent Broadcasting Authority is extremely paternalistic and one-sided. Their present dictum is that no organisation may advertise any message which is regarded as political. This is confusing because the IBA defends 'political' as 'relating to government'.

And yet they accept Government advertising! You cannot be more governmental than that. . . Moreover, it will not accept any *non* political advertising from any organisations that is regarded as political. Nevertheless, they will accept advertising from trade unions such as the TGWU — who are affiliated to the Labour Party, pay immense sums to the Labour Party, sponsor MPs, and provide chairmen of the Labour Party. There is certainly a need for a change by the IBA here.

One important form of political information is humour. The political cartoon in the newspaper is noted and retained quite beyond its size because it provides pleasure and because it is distinguishable in its form of presentation. And so it is with other forms of humorous political information.

Finally, should the State allow the dissemination of information from subversive or terrorist organisations? Certainly the police will close down on any official propaganda being issued by the Provisional IRA — though not by Sinn Fein. But not only do they allow information and propaganda to be put out by the Animal Liberation Front, who have been responsible for many incendiary bombs — the BBC have also recommended their address to innocent young viewers. The Home Secretary has argued that it would not be appropriate at the moment to close down the Animal Liberation Front because it is a decentralised organisation with no strong centre. But that is the recipe for any effective terrorist organisation these days!

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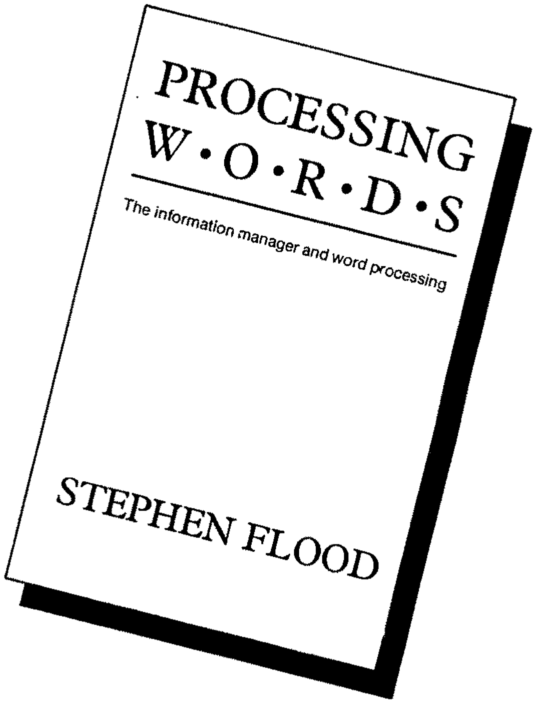

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The Information Question Time

Panel: John Widdowson, Michael Ivens, Robert Heller (Chairman), Alan Gomershall and Royston Brown.

This Information 'Question Time' was held at the 60th Aslib Annual Conference and Exhibition on 19-22 April 1988 at the East Midlands Conference Centre, University of Nottingham.

I still have an affiliation to BSI, but my current prime role is with a new organisation called Resource which is half-way between the British Government and BSI, with an express role to improve the influence of the UK through co-operative projects with overseas countries. So, the sort of information consultancy I was doing in Thailand and Saudi Arabia, and various other countries, I am still doing but with a wider brief to help not only BSI but other quality organisations and I hope possibly organisations like the ones you work for. One of the reasons why I am saying this is to encourage you to see me at a later stage if you have any interest in overseas developments of projects on the information side, to see whether we can assist or even contribute funds towards the development of such things. Having only been with Resource since 25 January 1988, I think it would be undiplomatic of me to speak on their behalf, so for the purpose of this exercise I am speaking only as **John Widdowson,** individual and traveller, with, hopefully, some outside view.

In contrast, I am who I appear to be, **Michael Ivens,** Director of Aims of Industry.

I am **Robert Heller,** Chairman of this session. I write and, as you have cause to know, speak. I am trying to be a successful entrepreneur to demonstrate that I don't just write and speak. It is interesting going — consult this space in about five years time at the present rate of progress.

I am **Alan Gomershall,** Director of SRISS and not accepting any questions on the possible changes of name at any time. Previous to that I was a member of the GLC.

I am **Royston Brown,** my background and training is in librarianship and I finished up as County Librarian of Cambridgeshire for the first five years that the new county was formed. Then I left the profession in 1980 and became Director of Planning and Research for the county council. Since 1987 I have retired from that post prematurely, and am working in consultancy, teaching and writing, however, I am on your programme as Chairman of the Library and Information Services Council for England, which as you know is a Minister for Arts and Libraries statutory advisory body.

Q. Jennifer Garland, London Borough of Sutton. Given that businesses pay fairly heavy rates, should they also pay for information provided by public libraries?

Royston Brown: Well the answer is, of course, that in many cases businesses do already pay for information provided by public libraries. I rather suspect this question may be in the context of the recently published Green Paper from the Minister. You may or may not know that the proposals in the Green Paper begin by clarifying the Government's intention to preserve what it calls the

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free basic public library service. It attempts for the first time to define what is meant by the free basic service, and in doing that it suggests that the interpretation of the Act should be that the service is free to individuals and that one of the ways in which public libraries should raise additional income is by charging organisations as opposed to individuals, including business and commerce, for services designed expressly for them. The public library service has a long history of operating in this field through a number of academic co-operative schemes which do make a charge through a subscription or direct transaction, so there is nothing new in this idea. What the Paper is suggesting is that if you really mean business in this way, then you should create separate cost centres for this, i.e. you should employ the staff, the expertise, design the service to meet the customer need, and let it stand the test of the market. If it works, then the authority will gain financial benefit from it and services can grow on the back of the free basic provision from the tax or rate payer. So, I can't see anything wrong if it is done in this way — the market will determine it's success.

Michael Ivens: I don't think there is any relationship between what businesses pay and what they get. They certainly pay quite a lot, so, if you are going to begin by saying let's give them something, I don't see why you should necessarily start with the library — there are all kinds of other areas. Secondly, with all the conscience of ignorance, I would like to just cautiously comment that if we are talking about local public libraries, rather than specialised libraries, I don't particularly want to see them as great providers of information for business. I don't really see this is a desirable tract to follow.

John Widdowson: That is actually an interesting point, but yes I think there are specialist agencies like my own ex-BSI information service which are likely to be able to answer questions on standards and information better than any public library, because at BSI they have spent the last 17 years building up the expertise. To answer the specific question, if libraries are going to offer a service, then I have no qualms that they should charge for it. I think the standard service is, of course, that the loan of documents from the library should be available to the corporate users as much as to the individuals, but when they start having substantial online bills, which the old age pensioners are expected to subsidise, that doesn't seem to be very sensible to me, so I think you should pay for the extra services that you can benefit from as a commercial client and, like any other service, probably prefer to do it that way.

Alan Gomershall: I have very little to add after all that. I would certainly support the view that businesses should pay. If I go and play squash or swim I have to pay for that and I am also a rate payer, and if I want to hire a room in a local authority for a choir rehearsal, I pay a substantial amount for that, so why is there any difference between paying for that and paying for information? I think that what is more worrying is the sort of service that the public library will be able to offer on its own, which may not be seen to be worth the money that is being demanded, I think that this is something that the whole profession has to address.

Royston Brown: Could I come back Chairman because the last two speakers have raised a point that I want to comment on. You will know that one of the initiatives LISK has taken in recent years is something called the Library and Information Plan (LIP); this is a planning instrument which brings together all the information providers — public, private, commercial and voluntary in an area, to decide how they will come together and organise their resources and make them available to the customer. Now, within that negotiating machinery you can devise who does best, for what and for whom. It may not be that the public library is the best resource for that kind of service but someone else in the area could do it and perhaps use the public library as an outlet, in which case it must be organised properly, and then funded correctly.

Robert Heller: My own supposition would be that outside the specialist libraries one is not talking about great sums of money, that are going to make a great deal of difference to the financial well-being of the library system. It is a point of principle. We seem to have reached general agreement that the citizen who happens to work in industry has as much right to go to the library and look up a reference book as anybody else and not be charged for it, so long as there is a free service. But if there is a question of tailored services being provided just for business users then of course there should be a charge and if the charge is excessive it will not be paid.

Jennifer Garland: My reading of the Green Paper is that any professional input from a service that requires skilled staff will be charged for, whoever is on the receiving end.

Royston Brown: For interpretation of the Green Paper, you need to read the small print carefully. What the Minister is trying to do is to capture in jargon, which appears very legalistic at the moment, what we mean by a basic service. Now what you and I would mean is normal lending and reference facilities. What he wants to offer at the same time is the ability for value-added services, and to define that, he says it will be the kind of service where an expert, or a professional, does something over and above the basic service for someone and therefore it is possible to charge. These are discretionary and not mandatory charges, an authority can do this for free if it wishes but if the Act is amended, it *can* charge for these services. So what he is trying to achieve, but may not have got there in his definition yet, is the kind of thing I was talking about earlier. I don't see that he is aiming at charging an individual who comes in and wants the normal reference service for free.

Alan Gomershall: I would like to make a point about the British Library, I know it is not a public library, but I think it is relevant to the question. Last year, we went through what is called a patents scrutiny by the DTI and the Government's efficiency unit. The recommendations that came forward about our patent service from that scrutiny was that we should charge for access. Now that's going way beyond I think what most library and information services would ever accept, and we rejected it and had the backing of the British Library Board to reject it. We have recently talked to several city librarians and have reinforced our view that access must remain free. In a way, it is making a stand against the insidious creeping in to the Green Paper of threats; i.e. if you want to look at a special collection that a profession has created, say a local history collection, you might start to charge. So, we are really saying access must be free and it's anything goes after that. Now I think we have won the patents issue, I know we are not in the public sector, but it affects the public library who hold the patents collections.

John Wales, ICI: I do think it is very important to encourage small companies in a region to be better informed and perhaps some of them are. We are too wooden in our ideas for charging for this and charging for the other. We can discourage the very people who become the large companies of tomorrow.

Royston Brown: Well, again I come back to the Library and Information Plan idea, which is aimed at bringing together not simply library and information professionals but Chambers of Commerce, the Business Services to small industry, the District Authorities, the Health and Water Authorities, the voluntary sector and community groups — in fact anyone who is in the information providing business ought to be a part in that planning approach. So we avoid unwanted and unplanned duplication and unnecessary gaps, and put the customer in touch with a network which is organised on his behalf — that's the ideal towards which we are aiming. I think this would go some way to meeting your point. We would not want to put obstacles in the way of those who need information and access to it.

Andrew Ettinger: One problem with this is that I personally have grave doubts about the calibre of the staff involved and their understanding of business.

Michael Ivens: Well I am a bit wet on public libraries. I was a terrible truant when I was young and the little education I got was actually haunting public libraries. I am very worried about the free side being undermined. Also, I wouldn't accept as a negotiating position that you can't get the money. I mean I would go hell for leather for getting the money needed.

Robert Heller: Yes I am not just wet on public libraries, I am sopping, because I, like Michael, spent a great part of the less misspent area of my youth haunting my local public library in Muswell Hill, London. I thought it was the most wonderful place in the world with all these fabulous things called books. I suppose one must always have as a priority to maintain a superb free public library system. What happens beyond that is an add on, an extra, not the basic thing at all.

Alan Gomershall: We, as many of you will know, started to charge for our business information service last October and I receive many letters, mostly from north of Watford I hasten to add, arguing that they were becoming deprived of a service because they were having to pay for it. Two of the letters I got suggest that some of the profession were getting a bit confused. The expression used was that the free exchange of information between librarian and librarian will become a thing of the past. I wrote back to both these people and asked them if we don't charge where is the money going to come from? We should either have a service for which you have to pay a relatively small amount or have no service at all — there is no such thing as the free exchange of information. These people are harping back to a forgotten age which probably never existed, and I think it is very dangerous when we get into that state of mind. It is like local co-operative schemes which I have my doubts about occasionally. The costings of those co-operative schemes if they were ever brought to light would probably wipe out every co-operative scheme in the country. So we have got to be very careful about the whole issue and not confuse ethics with survival, perhaps.

Jennifer Garland: We have been getting business sponsorship for the last 10 years, that side of things is unusual but not new. I feel very sad that as librarians we are seen as a group who traditionally sit on material. Without the staffing, a few tatty books on a shelf does not make a reference service. The reference service is the exploitation of stock by skilled staff. I do accept the point that there are libraries and libraries and some are better than others. I also accept that point that we need a little competitive edge, but I find unacceptable the principle that someone has nowhere to go to check information that they have read, to read a Green Paper, or to start up a small business. For example, I would get an enquiry on my desk about once an hour about how to start a small business — they have read the stuff, but they don't know where to go. We act as switching points, we send them to other people who send them to the Enterprise Agency in the town. All these sort of activities I feel will create a gap if they are no longer there and they won't be there without skilled staff, I see no hope in the Green Paper for that continuity. It seems to take the view that just a few books on a shelf is a service — not the exploitation, the use or the guidance that goes on in a busy reference library. Perhaps I am a pessimist and you are all the optimists.

Robert Heller: I think one thing is absolutely certain, that simply because of the demand in one way or another the volume of business services provided from libraries will increase — that's inevitable.

Q. Susan Warhurst, I was until recently with Ted Bates advertising agency until that agency's merger with Dorlands advertising agency. What do the panel think should be done and by whom to make managers more aware of the importance of information as a resource and its potential for improving profitability and productivity?

Michael Ivens: Well I think if you are going to introduce a concept into an organisation, you try and introduce it at all levels. The most important level is clearly at the top to get it (whether it is information, or some other aspect of managerial behaviour) accepted as an important part of managerial life. Then you have got to see if people feel they are going to be valued more, promoted more, given more money or whatever, so they actually take the concept to heart. Certainly management training, showing managers the value of the information aspect, whether you are doing it in straight talks or in case studies, or in syndicate etc., is important. Secondly, you should build into things like job specifications and your management appraisals, the information aspect, so that when a manager is looking at what he is going to be doing in the year ahead or accounting for his or her activities, there is a good chunk on the information aspect. I think that would certainly help.

John Widdowson: I would have answered this question by yes, I know how you get people to appreciate information — by enthusiasm, by persuasion, by busting a gut to give them the extra service, by giving them the information they need, by hopefully getting them to see that their own performance does improve by having some data. Perhaps people are beginning to recognise this. An organisation I have had something to do with had an external survey carried out and in this even more managers than before recognised that information is an integral part of their organisation's activities. Subsequent to that they seemed to have gone in the opposite direction, so I am very interested in the answers to this question. I think one has to recognise that there is a cycle in life and whatever you do it goes up and it comes down, but you can go up again and I am still confident enough that in the fullness of time it will go up, but I think this is a very difficult problem. It is a remarkably difficult area. I look forward to the panel and the community putting forward their own suggestions.

Royston Brown: I think the problem lies deeper than this, but I would like to think about this aspect of it. Last year I led part of a British delegation to a three nation conference in Canada on the effects of information on the economy. One of the things that the three nations came up with was the fact that we lack efficient measuring tools to tell us what the impact of information is within the economy, and if we can't demonstrate that to managers and to politicians we are at a loss. All the conventional means of measuring the economy talk about inputs and outputs. It is very difficult to establish cause and effect I grant you — but can we find some way of showing, in an information economy, what the impact really is and therefore what the value of people who provide information is, what the product is worth and what impact it really has? Now if you can get that kind of set of tools and equipment clear, we would then have the ammunition to put into managers. This is where I think the problem lies.

Alan Gomershall: I wasn't absolutely certain I understood the question. But having thought about it, I think the answer lies in ourselves to the first part of the question — by whom. For years I have been preaching about the appalling way that we present ourselves to our management and our customers. We have all seen the tatty information bulletin stapled in the top left-hand corner, which hides the title of everything. We have all produced them over the years and have sent them out; and then how often have we looked at the people from outside sending information to the same people in attractive, coloured presentations, and our tatty bits of paper are setting off on the same route. I looked at a particular city library's patents collection not long ago and they sent me a leaflet so that I could find my way to the library. This leaflet was printed on pink absorbent paper, you could read both sides of the paper from one side, the map on the back to show me where the library was blotched and illegible. This was the only bit of publicity that they had about their collection. Now, I am sure that is an extreme case nowadays, but I have far too often seen inadequate presentations which reflects so badly when compared with other types of service being offered to the people we are serving. I am sure we can all learn from all the new technology particularly if we use it properly. We can make a much bigger impact with the people we are trying to serve and influence.

The second part of the question — by whom, I will now deal with. I think we are getting to a point in the development of libraries, perhaps special libraries particularly, where the customer no longer wants vast quantities of printout and basic information. He is starting to want what, I think they are calling in my organisation, intelligence. He wants somebody to analyse the information for him, and give him a condensation, something which adds a bit of value to it rather than the three inches of printout that you see so often on peoples' desks. I think perhaps the library schools are a starting point here, when they start to investigate the sort of skills they are going to give their students so they can come out into a profession which has to move forward. Our competitors are providing that sort of intelligence rather than information. I don't think on the whole that we are yet, it may be a point to raise when we start charging for services from the public library, if we do charge; adding that value of intelligence and analysis will be something that will keep us going and help us survive. Those are just two ideas. I don't know that it will help but I am pushing my people anyway to look at this concept of intelligence.

Robert Heller: I think there is a whole mass of problems. One problem is the simple 'I wish to stay in my own lovely state of ignorance' argument — people who just don't want to be told that this is a common reason for them, for example, not buying outside market research. It has to come to be part of the climate of the firm that you do insist in getting excellent desk research, I think this is one way in which information managers can make themselves indispensible. If you know you can ring up somebody in the company and say listen, where can I get a research report on selling a hydro electric project to Zambia, and you get back a really excellent, concise document which covers all the points you wanted, that would make you think you have got something worthwhile. I think the barrier of invincible ignorance can't really be overcome in the atmosphere of the firm, when you get rebuked in front of your peers if you haven't done your homework. As for making the use of information commonplace, I have high hopes of new technology and I think proprietory executive information systems are going to make a big big difference. In John Harvey-Jones' book there is a rather poetic passage, by it's standards, about what happened in the ICI boardroom. They actually got themselves set up with electronic displays so they could play around with the variables of the company, and play around became a very important word. When you get these things on your desk, it is like when you first get your PC, initially you sort of look at the thing and skirt around it, open the manual, put the manual down and so on, but after a while you start playing with it and sometimes the play can take over everything else — you have no time left for any work. I think once these people get the terminals on their desk, which they are shy of at the moment, once they begin finding out what they *can* call up from the resources of the company's information services right there and then, conveniently, with no one watching what they are doing, I think they will become much more interested in using the information resource, and of recognising how to improve their profitability and productivity. So, I really think that because these things are going to become commonplace — there really *is* going to be a terminal on every manager's desk and it really *will* have useful information available to all of them under control whenever they want it — because of that I am hopeful. I think this problem may be one of the very few problems in life that actually goes away.

I have to say, that the amount of management information that I see in the companies I deal with now, if you compare it with 10 years ago, has increased dramatically and it is not just the quantity that has improved but the actual quality of the information — and it's getting progressively better still.

Alan Gomershall: But isn't this the same as I was saying, presentation is all? We are having to compete with a lot more people presenting themselves to managers. We don't do it very well. We switch people off when we should switch them on.

John Widdowson: We are in the process of creating a CD-ROM version for the end-user. I have an excellent engineer who has now got a principle role in training in online services. When we first came through his door, saying the EEC is gong to pay us some money to set this up, his attitude was negative because he suddenly saw part of his professional business of training other people, and being a professional to the media, going out the window, and it wasn't until we could amplify that and prove to our own satisfaction that the end-user won't get into the really complicated business, he settled back down and started sharing his expertise on what the end-user system should look like. So, I think this is another feature — that there is a little hung group that thinks if they keep quiet and keep everything they know special and different they will at least survive and the organisation will go on around them. I am afraid that is not true and they have got to recognise that the end-user is part of their business.

John Wales: There is a negative way of doing things and a positive way, and we shouldn't be worried about going out there and trying to get alongside people and work with them to monitor the value of what they are doing.

Susan Warhurst: I am in the situation now of going for interviews, and when I have been to various advertising agencies the first thing they say before the interview has started is that they aren't quite sure what they have to do with the information they have. So, I think there is a great onus on everyone who is currently in work, in information work, to justify their existence.

Robert Heller: Of course I can be frightfully smug as a journalist, because journalists are probably the best users of the in-house library services of any occupation, except perhaps solicitors, because we have to. We can't write our pieces unless we copy other peoples.

Q. Mae Keary from the Department of Trade and Industry. What do the panel think about spending four hundred million pounds on the new British Library building?

Alan Gomershall: My first response is that the Government have just cancelled Nimrod after eight hundred million pounds was spent and we have got nothing for that. So, a reasonable help with four hundred million in 1992, when the place opens, may be something more attractive. Since I've got to the British Library, I have noticed perhaps more than I used to do, because like everybody else before I got there the British Library was that strange being in London and Boston Spa and other places, and didn't mean a lot to me, except a main centre desk in my reading room which used to frighten me. When we get into that new building I suppose that's the time when people will start to decide whether it is worthwhile or not, what sort of services we should offer, whether we change, because we have heard a lot about change early on today. I think I recognise we have got to change, because we have got to move away from the very traditional – if it doesn't move shelve it or if it does move it is probably alive (and its probably one of the staff). There is that dreadful image about the place which we are desperate to try and change and to get people to recognise the change. The tax payer in 1992, after the four hundred or five hundred million by then, won't be happy if he or she is told that everything is on closed access and he or she has got to fill in a form and have their photograph taken, and be vetted by the Protection Act and all the rest of it. So we've a huge image job to sell to the public. On the other hand I think it will be an enormous boost to the profession if we present our image correctly. It will be the first time that the public at large, I hope anyway, will realise that we are *not* still part of the British Museum and that's a stigma that I think will be there for a long time to come. We will have our separate building with all the magnificent facilities that anybody could ask for, there, I suspect, for the profession to use. We will have our own site, our own image separate from anybody else's, and in that way it will become your national library just as much as mine or anybody elses. It will be there for everybody to make use of. A combination of us getting the service right and your making good use of that facility, and its potential as a promotional facility for the whole profession, should get it right. All in all I don't think it is very much to spend.

Robert Heller: Logically, nobody can disagree with you there. Do you think it is a good thing that there is a new central British Library being erected?

Michael Ivens: I really must plead ignorance. I am told, in fact, that the present building isn't sufficient, and so I accept the argument. Assuming that is right, you have got to have another one.

Alan Gomershall: The British Library has, at the moment, 11 sites in London and one site in Boston Spa, and I think we have one site at Woolwich which occasionally things are extracted from. Every building we have is overflowing. The staff, in some cases, have the most appalling conditions to work in. We are trying to work with antiquated equipment and buildings and we have heard time and time again today that we must use modern technology. We can put some of it into those buildings. It will never be as effective as it will be in something built, perhaps, for the next century, as obviously the new building will be, but 11 sites in London makes no sense. By the year 1993 say, the whole of London traffic will probably have ground to a halt and nothing will ever move again and that will mean that the 11 sites will no longer be in contact with each other, and we will not be able to bring material to the centre desk for the customer to use. Even at that practical level we have got to pull ourselves into one focal point for the whole profession.

Michael Ivens: And it shouldn't be seen as a PR monument for librarians.

John Widdowson: We desperately need something that everybody can focus on as the national service. I am a little reluctant about the large expense of the centre and until you amplified it I actually didn't even realise the immediate advantage of the tying in of the 11 sites together. I think we do need it because it is a national service that we ought to exploit more.

Royston Brown: This is obviously a difficult question to pass value judgements on given the sheer scale of the project. Alan has mentioned the 11 sites in London which indicates roughly 10 years building.

You look at the new building and think of the design of it and the planning permission and all the rest of it. Of course you are well into the immediate danger then of being overtaken by the events when the building was conceived, and it was planned to bring together materials to a central point from ease of access and moving rapidly into an arena where location is immaterial, where the information content can be shipped down there, transferred, stored, accessed and so on. I am not sure that that featured largely in the design concept of the British Library at the time it was thought up. As against that the concept of the British Library is new. The British Library Act of 1972 was an attempt to create a single institution amalgamating a wide number of different bodies and the culture and background of the two is clearly different. Focusing much of that on one building and bringing it together clearly is going to have an effect on efficiency and effectiveness. I do have a question mark about the longer term feature in terms of the way that information will be processed and handled.

Robert Heller: I think that is a very good answer. I suppose one other thing that makes me sympathetic towards it is that, for various reasons, of the relative national economic failure. We have been rather starved in this country of great public projects which have no specific economic purpose, but which are aimed at improving the whole culture and education infrastructure of the country. I tend to applaud the sight of something actually going ahead and I think it has been a great tragedy within the development of the many amazing sites that have been available both in London and elsewhere, that there hasn't been a sufficient public participation in producing things that are for the community as a whole, and not just parts and private developments. I have a sort of instinctive bias towards this project but I do share Royston's worry that we may have been fighting the last war, as has so often been the history in our real wars, and that the building will be magnificent no doubt, but maybe before the end of the century will be shown to be superfluous to need.

Royston Brown: My answer is really rather as I said before – we have got to get the image right. We can't be seen to be closing doors on people once that building's opened. It does worry me seeing it from my side which is open access where anybody can go in and use whatever they want. If the closed access entrepreneurs have their way, far too much of the new building may well appear closed to the people who have paid to have it built. I think we must alter this over the next two or three years, if we are going to be seen to be offering the country what they expect from a national library.

Q. Paul Neville, BBC Television. I have been in the British Library reading room and the science reference library and the contrast is very marked. I think that one provides information and the other provides, no doubt a very

useful, research resource. It is no good to people who need information to be told that they have got to wait two hours for books or six weeks for a photograph. If you are working in television, a programme is going out tomorrow or even the same evening, not in six weeks time, and I think that the British Library ought to be saying very firmly now that they are about library services, and they are certainly going to provide them in the new building. I would like to see the responses when people write to the newspapers saying let's keep the reading room in the British Museum. I think we ought to be writing back and saying hang on a minute it is information that we need, not academic research.

Robert Heller: I've always liked the thought of Karl Marx sitting there deep in thought and plotting the end of Western civilisation as he knew it.

Michael Ivens: We think that Lord Thomas is also plotting the end of civilisation.

Q. From the floor. I think we are moving towards the idea of an ideal manager and I am interested in what are the qualities that make a good manager and, perhaps paradoxically, should we still encourage individual managers?

Robert Heller: What makes a good manager? I am going to exercise my Chairmanly prerogative and kick off on this one. There is no answer to this question, which is nice because I can then pass it on to everybody else, but I'll make an effort. You can't help individual management styles, because every single human being on this earth is different from every other human being and, therefore, every manager is different from every other manager. Situations also have an impact on the way people behave and so you get different styles. There is no one good management style. If I were to say what I think are the qualities of those who stand head and shoulders above their colleagues it is this, if they set out to do something it gets done and it gets done expeditiously, they don't waste time, and they do it by bringing people with them. I mean the essence of a good manager is that they are good at dealing with people. I also think that the ultimate test of a good manager doesn't lie with the success which they achieve right here and now. Particularly if they are leaders of an organisation, the real test is not what they achieve in their presence but what happens after they go. That is a very severe test and its amazing how few great leaders actually pass that test. A Churchill tends to end up with an Eden following him, for example, and there are reasons for this. One reason is that for people to be good enough to follow a very good manager and do better still, they must also be very good. Because of their requirements and the human ego, powerful men and women are somewhat reluctant to have equally powerful people near them. It is a great test of someone's magnaminity and ability to cope with their own psychological pressures and to surround yourself with extremely able thrusting people who are capable of doing the job as well as you can, if not better. There is a marvellous book called *The Psychology of Military Incompetence,* which demonstrates that the world's best generals have always been very warm hearted people who are open towards their colleagues, even though their colleagues, by definition, are hierarchy held in subordinate position who have no side, no affectation. These generals leave behind them a superbly trained and efficient force whose personality spreads the whole way down through the organisation. They are both deeply respected and loved and don't rule by fear, they rule by force of example and by their own achievements. So, what I am really saying is what makes a good manager is the same sort of quality that makes a good human being, but with the added drive and ambition without which you cannot get things done.

Michael Ivens: Can I just make one or two points first of all. There is a difference quite clearly between a manager and a first generation entrepreneur. I remember reviewing a book some years ago — a so called psychological study in depth, of the life careers of 1,000 entrepreneurs in Michigan — you can't generalise the world from Michigan but nevertheless there were some thngs which stood out. These successful entrepreneurs tended to have left school early, had poor relations with their father, had a straight man who was the works manager or the accountant who they shopped after a while and they tended to put women on a pedestal or use them as consumable products. This is not the well rounded manager if there is such a thing.

John Widdowson: I think, on the inside looking out, perhaps particularly at director level, the only criteria for a manager that I particularly want to see is a man who makes decisions. In some circumstances I don't even mind if the decision is wrong because you know where you stand and you can do whatever is appropriate, but a manager who goes on waffling, delaying decisions, circulating questionnaires and organising committees is a liability because you don't know where you stand — we need more positive decision makers.

Robert Heller: That rings a bell with me. I worked on the *Observer* in the days of David Aster, a great and wonderful guy, I loved him, but what a rotten manager, who, it used to be said of on the *Observer* — the editors indecision is final.

Royston Brown: I would like to pick up the point that Michael made about this concept of the chartered manager and really to say what is a manager. I remember 20 years ago, before local government reorganisation, when I was running the city library service in Cambridge, sitting at a late night council meeting alongside the Medical Officer of Health for Cambridge before health reorganisation, (that tells you how long ago it was). The city council were debating the employment of management consultants and a doctor turned to me and said there is no such thing as a manager, just as there is no such thing as a doctor. There is a doctor of medicine or a doctor of music or a doctor of law or a doctor of philosophy he said, you run the library service and I run the health service and that councillor who is shooting his mouth off manages a shop. I think there is more than a grain of truth in that. You will have seen in the *Sunday Times* no doubt an article about the chartered manager concept recently, in which it also expressed doubts about this. It said what you mean by a manager varies according to the location and type of business he is in. The manager in one organisation is required to take risks and to keep in front. Another manager is required to analyse information and reduce commercial risk. So you are talking about different kinds of animal and you need different qualities to make a 'man good' in both those locations. But my favourite definition of management, is the art of getting things done through other people. Therefore I would say that the manager who achieves that is a good manager.

Robert Heller: I once read a book called *Can you trust your Bank?* and clearly the last thing any banker should ever be allowed to do is take a risk and there is plenty of evidence to support that. If you take part in an immoral or wrong action whilst doing your job as a manager — putting the organisation and your role in it ahead of moral ideas which you may not share yourself — then you of course share in the responsibility and therefore it is a crime, a punishment which is certainly deserved because it was part of the crime. Anybody out there have anything to say on this subject?

Stephen Farr: This idea of a manager getting things done through people is an important point. I think that everybody to some extent is a manager. Quite often the person you are getting things done through is yourself, I think this is sometimes quite an important point that is lost on some managers who see it as a role, a position they have to fulfill and don't always see that sometimes the managing is the getting things done through doing it yourself. The other key attribute is the ability to walk the job, of being aware of what happens on the ground.

Alan Gomershall: I decided to take your view when I first got to the British Library and walk the job, and I had to be rescued twice from the vaults in the first fortnight, I got completely and utterly lost. So there are dangers when you decide to carry out this participative management. Of course that is one of the strengths of the proprietorial management, who certainly have a much better record of making businesses grow organically than the professional would be (or possibly chartered manager). One of the strengths is that he walks the business all the time, he walks it in his head, he is always out there, he knows what is happening before it happens most of the time. Anybody got any views about the chartered manager question?

Michael Ivens: Nobody would disagree that you want effective training for managers. I think there is a very good reason why our managers are often less qualified. There are two very interesting studies which were done in the 60s by a man called David Grannick, one called *The Red Executives* and another you have probably read called *The European Executives* — studies of Europeans, Soviet, Japanese and American management. Grannick started off on the impression that Britain was the sort of great class divider of society, what he discovered was in fact in industry Britain was the last remaining big industrial bastion where you could actually be promoted from the bottom to the top. People never believe this until they actually look around at the Engineering Employers Federation meetings, etc. The normal method of promotion in a lot of engineering industries was from draughtsman from apprentice upwards. Now this had great advantages, I think, because it made us look the last socially mobile industrial nation. The great disadvantage was that a lot of our managers lacked qualifications. When I look around some of the best entrepreneurs I know will never actually get anywhere as managers because they certainly won't become managers on that basis and you won't be creating some of the very interesting companies that they actually have created.

Robert Heller: In the period going up to until well after the last war, some apprenticeships offered by some companies were really postgraduate university courses, because there was no alternative. There were no polytechnics of sufficient size, and to become an apprentice then was to put your foot on the rung of the ladder that led up. It was an inadequacy being repaired in the educational system. The fact of the matter is that we have a basic education system in this country which is a worse preparation for managerial jobs or for any kind of jobs than anywhere else in the world. So it seems to me that a chartered manager in a way is a rung in the ladder where there are no other rungs below it.

Royston Brown: Can I come back and reassure the BIM Chairman, I have been a follower of the institute for many years and past Chairman of its Cambridge branch, and I joined because I believe in education and training which I regard as a life long exercise, a continuing thing, but my doubts were about this specific proposal of the chartered manager with all that goes with that and codes of practice and the prospect of restrictive practices rather than the reverse.

Robert Heller: Yes, and a slight intimation that managers status needs to be raised to that of those wonderful people the solicitors and the accountants which I am not sure is true at all. This could be another of these fighting the war that's already over engagements, because frankly the younger generation of managers are much better educated and if they don't get what they want in the firm they will move to another firm where they do get what they want.

John Widdowson: I am that sort of manager so I thought perhaps I can make a comment. I became a manager about 10 years ago. When I became a manager I said to my boss I would like to be trained to be a manager please so I can do the job properly, and he said there isn't really any training to be a manager other than managing, but I will send you on two courses which will help you. One of these courses was influencing skills and the other was coping with conflict, both of which have been very useful, but I would like to stress that there are forms of education which aren't necessarily appropriate in a conference room or a lecture theatre, they are for actually dealing with people and learning how to deal with people. I think that a good manager, as has been said, has got to be able to deal with people effectively which you can't learn how to do in one week or one day. You have actually got to put the techniques into practice and learn from your mistakes, I believe, if you are going to be an effective manager.

Alan Gomershall: Well you have to be supportive with some people, who work for you, but you also have to deal with lots of people who don't work for you, perhaps in the industrial relations area, and from people outside your organisation and that's all part of the job too. I'd agree with you that you have to really be able to help your staff be effective. I think one has to stress that the human relation skills are an essential part of the job but are not the only part of the job — there are a mass of other things that a good manager has to be good at. It is a very demanding occupation at all levels and that is why it really does require as much preparation and coaching as possible.

Q. Bob Norton, British Institute of Management. My question is where the idea of tradeable information fits in, since the Government in 1983 and again in 1987 has a fair notion of information as a tradeable commodity. Would the idea of tradeable information create an information thundercloud?

Robert Heller: You mean if you can't pay for the information you won't get it. Do you think that is the risk, Royston?

Royston Brown: Yes I think it is a risk. It is something that professional librarians have been worried about for some time. The question is what you can do about it. It is a situation that always has existed. There are lots of things in this world that you can't have if you can't pay for. So the concept flows from the idea of information as being a right. The thing is summed up in the fact that there is a difference between the flow of free information and the free flow of information. You can argue that there is no such thing as free information anyway, there is a cost in its gathering and storing and access and so on. I think, however, if we do move forward into a tradeable information area there could well be people in the community who are disadvantaged and not able to get access to that information through normal channels. I see the problem of dealing with that as a responsibility of the public sector. There is no reason why local authorities, for example, in whatever scale of charges they impose couldn't provide subsidies or make exceptions for certain people who are penalised. It raises all kinds of hairy problems about how you analyse the disadvantaged, but I think a society that is concerned about the community which needs and uses information, would be wrong to say the whole of that has to be on a cost basis only, because there is certain information you need to be a citizen, to have a democratic right to vote, and to know what is going on, etc. So I think the whole question is much too simply put for us to give a snap answer to. There are sectors where it will be extremely significant if certain people were deprived of information through inability to pay. In those cases things can be done about it.

John Widdowson: Information has value which should be paid for. I think there is a case for raw material, raw information being free, but I think as soon as you do something with it then it is quite realistic that that should be charged out at the value, the added value of the information. So I think my own view is that yes it is a very realistic thing to recognise information as a product.

Alan Gomershall: The answer yes that I think there has been information and little else for hundreds of years anyway and the danger perhaps is as Royston has pointed out, is that it might become more accentuated the way the pressures are moving us. As a profession it is up to us to try and ease that problem and we have mechanisms, we have systems of our own to do this and it will be up to us to do it or not, and in my case if the Government gives me enough money I shall make it as easy as possible for those without the funds to use what I have got. If the government don't give me the money it will be then that it becomes a big problem on a professional level.

Bob Norton: Yes, well I spend most of my working hours as a manager fighting somebody in the Government for that money and it isn't easy to extract it from a government which has one particular philosophy. Some of my colleagues say it will be all right if the Labour Party come to power next time, they'll give us the money. Now that is the most naive statement I have heard this year. We are moving in a world which is forcing us into this sort of position and it is up to us to fight, as you say, as much as we can and balance things so that somebody isn't too deprived or isn't completely written off.

Andrew Ettinger: And we have to recognise that right now a vast amount of information is available very expensively which is, by definition, only available to those who can afford to pay for it and a lot of the databases, commercial databases, cost a great deal to access and they are not available to the underpriviledged. These people never even know they exist actually and it has long been true that certain sorts of information give you a privileged position and you can make people pay for it. For instance, if you possess a list of names of people with certain desirable qualities to a seller of goods or services you can sell those names, that is information. There are certain lists of names I would dearly love to have and I can't extract them from their owners. So we exist in a world that has long been recognised and I suppose that is why governments pay spies. Information is power and if you know something before somebody else does, you know more than somebody else does, then you are in a position of great strength and I suppose the burden of everything we have been saying all today is what a valuable source information is, and of such enormous potential. Peter Drackar did call this the knowledged society that we have moved into. It is like the sea, it has its own tides and people who try and suppress information invariably end up being crushed under the weight of their own suppression. Any further observation on this?

Robert Heller: Can I just add to that, that part of the reason for concern about the underprivileged if you like, in information terms, has in the past been for social reasons. I think there is an economic case but if we believe that information is a new currency for economic growth and development then it will be the countries that manage and organise information and make it available to all their citizens to feed off and use constructively that will survive and so we have a duty to make sure that the corner of the market isn't restricted to the few.

Royston Brown: And that of course is where the great universities come in above all. I'd be happy with that.

Keynote paper: A view to the future for the information industry

Yvonne Bennion

Division Director, The Industrial Society

Paper presented at the 60th Aslib Annual Conference and Exhibition on 19-22 April 1988 at the East Midlands Conference Centre, University of Nottingham.

I am extremely grateful to you for giving me an opportunity to contribute to your conference, though as someone who has followed a career somewhat removed from your immediate concerns, I should say that I never in my wildest dreams imagined as a trainee librarian nearly 20 years ago that I should be standing here today!

You may perhaps have felt that the synopsis of my talk was rather more related to coping with present changes than with the *future* that is my prescribed subject. I hope you will forgive me for this, and yet I make little apology. I have a *vision* of the future, otherwise I should hardly be working at The Industrial Society — an organisation which has for 70 years concerned itself with the dignity of work and thus the just and reasonable treatment of people at work. But I am not sure I have a *view* as such. I rather marvel at the confidence of those with 'views' — usually on most things in life — and am more comfortable with basing my plans on proven experience and sound facts. Indeed, in The Industrial Society, we are perhaps at our best as purveyors of common sense. In this respect, it is especially important that in our management advisory work amongst our 16,000 member organisations, we start from where people *are* rather than from where they would like *to be.*

If we look for a moment at where your industry is, two aspects strike me as particularly relevant. It seems that some of you are very much in a period of retrenchment whilst for others the growth of information services knows no bounds. On the one hand, there are organisations, perhaps of an institutional nature and in the public sector which are trying to maintain services on more slender resources, and others offering services to a greater extent and of a more sophisticated nature than ever before — but their services may be provided by dint of technology and may offer jobs to relatively few people.

I would suggest that this is a pattern similar to that across industry and commerce and that our current experience suggests this trend will continue in the forseeable future. Nor do we see any slowing down in the pace at which we expect people to adapt and make changes in the way they work.

On the one hand, we see service aspects of organisations, such as information departments, measured by increasingly tough yardsticks of effectiveness and

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necessity to the organisation. In the institutional world they are facing competition from commercial providers of information who often build up great expertise as specialists in particular areas. It may seem relatively expensive to access this kind of bought-in information but it is undoubtedly attractive set against having to absorb the total employment costs of one's own staff.

We see no relief from the rigours of a world, in which it is increasingly an asset to survival to be able to show and to measure the contribution which services like information contribute to an organisation. In The Industrial Society, for example, our Information and Personnel Advisory Service is a very practical way in which we manifest our objective of spreading the best practice in employing people. We take over 10,000 enquiries a year, mostly over the telephone. In the measures we have established for usefulness to our organisation, the service is acknowledged as an invaluable support to maintaining the membership base of The Society. This ranges widely across the spectrum from entrepreneurial high technology companies, through traditional manufacturing, financial institutions, government departments, hospitals, schools and colleges. Since there is no special charge for enquiries, the service is a cost centre, but we are able to fulfil our objectives in spreading best practice on an individual basis which it is otherwise only possible for us to provide through the much more expensive vehicle of in-house advisory work.

Our advisory staff experience no lessening up in the pressures to convince both potential and existing members that there is some tangible benefit to them in belonging to The Industrial Society. Very few organisations today are Members of The Industrial Society because it is 'a good thing' or there may be a certain warm glow in supporting an organisation because it exists to promote the best in employment practices and the greater involvement of people in their work. Our subscriptions are relatively low because 95 per cent of The Society's £15 million annual income comes from our public and in-house training and advisory work on an individual pay-as-you-go basis. Even so, our Regional Advisory staff out in the field, on whom the brunt of securing and maintaining the membership falls, find our Information and Advisory Service a very helpful tool indeed; not least because they have become accustomed in the last five or six years to the smallest of subscriptions being placed under close annual scrutiny for usefulness. We expect this more rigorous attitude on the part of our members to continue.

We also find that our particular style of operation is proving increasingly attractive in looking after and retaining our customers. Our Information and Personnel Advisory Service has always been biased towards giving advice supported by information. It was not until I ran the Service that I became aware of the power of combining information and advice on how to use it. That is why our service is staffed by a mixture of people qualified as librarians and experienced in personnel and line management. I mention it because this apparently attractive combination has had some interesting consequences for us as The Society has grown very considerably since 1981. Not only has the overall number of enquiries increased, but so has their complexity and range. Many of the enquiries are related to the application of employment and social security law. The enquirers themselves may well subscribe to detailed legal and technical published information services and are often professionally qualified employee relations managers. Consequently we have to provide a very high degree of immediacy of information retrieval combined with the highest standards of professional management advice — and enable our members to feel that from health and safety and absenteeism to unfair dismissal or pensions, that advice is freely and constantly on tap.

We have, in order to meet these basic requirements, become practised in the last 10 years in what the academics have fashionably labelled 'core and peripheral' workers and thus the use of freelances and part-timers. Certainly in our own case and the experience of many of our members we see this trend becoming more pronounced in many fields of work, although in the case of our Information and Personnel Advisory Service, the reasons are highly specific.

The economics of our organisation are such that we cannot afford to employ *full-time* lawyers and pensions specialists, for example, who are capable of providing at the most complex level, the calibre of advice our market now demands.

We have in practice been required to decide very firmly on the priorities for spending our salary bill; and what we actually do is a reflection of our definition of our core activities. The Industrial Society is essentially a mission about good practice in the management of people at work in which we see the employee relations functions as essential, skilled back-up. Our priorities for full-time staff are therefore for highly qualified personnel and line managers who are in turn backed by trained information workers. We are thus clear in our own objectives; and the specialist skills which we may keep on a retainer or 'as need arises basis' also have a clearly defined role in our structure. In working in this way we offer a highly flexible service which enables us to avoid giving the impression that a member may only have a particular kind of problem or enquiry on a given day because the relevant specialist may be unavailable at any other time.

You may, as a side issue, be interested to know of our experience in looking over the years at the various computerised information packages available in our field, especially since our enquiries have such a high legal content. We have found that many of our enquiries have a high bibliographical content and we supply many unpublished company documents to demonstrate good practice in policies, procedures and agreements; but so far we have found that our Information Advisers need such an intimate, detailed knowledge of employment law and its practical implications in order to answer enquiries and advise according to the individual circumstances of the case that we have so far been unable to purchase software which would substantially increase our efficiency by widening our scope or increasing our speed of reaction; or enhance the depth and overall quality of our response.

I have tried thus far to point out the features of retrenchment or growth and the pressures for cost-effectiveness, increased quality and efficiency and the effect this is having on employment patterns. In these respects I do not believe that we in the information world are in a substantially different situation from our colleagues in other disciplines and activities. The message for the future is that organisations must undergo continuing cycles of change and reorganisation to improve efficiency, and in the private sector — profitability. Unless the provision of information happens to be the core activity, it is very likely that the place of the information service within the structure of the organisation makes it very difficult for the information providers to be amongst the chief arbiters of change and decision takers. So often the task facing those of us who run information services is, and will remain, to implement strategies which have been decided elsewhere. Ironically, these same strategies may, in their influence on budgets and staffing levels, make it appear more difficult to offer the standards of service that the organisation demands in its constant quest for efficiency.

In these circumstances, the pressures on individual managers of information services must be profound, and in our view will require far greater attention to be paid to general and people management skills than has tended to be the case in the information world up to now. I notice that Professor Moore is to talk about the interesting career development routes which information jobs offer through to senior management. I do not wish to pre-empt Professor Moore in any way. May I, however, venture to suggest that, in The Industrial Society's experience, senior management posts will increasingly go to people who can demonstrate a high degree of general management competence and versatility — as well as to those with superior technical information skills.

It is therefore crucial that the way in which we structure the organisation of our departments and information services is a good balance of what is needed to look after our customers — both inside and outside the organisation; and that it is consistent with structures inside the organisation — and that we have looked ahead as far as we reasonably can to avoid a humiliating and quite unacceptable degree of chopping and changing.

In looking reasonably into the future we must look at the team around us and judge whether these people can really deliver what the organisation requires. For inevitably as business life gets tougher, the standards required of individuals are exacting and unremitting. I think this can be especially hard for managers of information teams because they are often small and have excellent close working relationships as a result. Nonetheless, whether we are in the contracting or expanding area of the information world, being lax in the selection of staff and the standards we expect of them only has disastrous effects at some time. That is one of the key lessons to emerge from our experience of industry and business in recent years.

The emphasis on higher standards of performance is having an effect on the way we reward people, with great emphasis on performance related pay. You may care to consider anew what are the best measures of performance for staff in your own information service.

There is undoubtedly a new awareness at senior management levels of the need for systematic training to help people perform to new standards and to widen the individual's portfolio of management skills. May I suggest that an action point should be for you to establish that you and your staff have a well recognised place in the training priorities for your organisation.

we in The Society know well, the training market is very volatile, and some part of the current emphasis on training is undoubtedly made possible by the increased profitability of companies and the present perceived buoyancy in the economy. Nonetheless we do see at long last evidence of companies adopting a more planned and strategic approach to training. I should have thought it is important that information workers are in there — up at the front.

It is of course true at times of change there are so many pressures that can take one's eye off the ball — make it seem difficult to release people for training — so there is a temptation to treat it like the road to Hell — paved with good intentions. But there are two essential management actions which I would exhort you never to neglect. The first is that of paying attention to keeping staff fully in the picture about plans and what is expected of them in a systematic way. I'm afraid that unless you commit yourself to doing this and accept the inroads this will make into your time as a manager, it will be very difficult to take people along with you. We all know this to be true; yet so many of us still get it wrong. It is as well to remember that there is absolutely no reason why staff should *automatically* trust what management says, especially if a time of stress and change succeeds what the staff may perceive as mismanagement. Good communication is essential in building up trust and I trust you will not fall into the trap of presuming that because many of you work in small teams with good working relationships that you have no need of anything more thoughtful or formal.

Finally — and perhaps the hardest discipline of all, is to monitor and evaluate the effectiveness of what we are trying to achieve. This is in some respects an organisational discipline — but it entails a large measure of self discipline. It is the easiest thing in the world when we are rushing from one pressure to another to neglect this drill. Everything I have talked about places an onus on us all to organise and plan more effectively. I would suggest that to monitor what we are doing is the final and essential piece in the management jigsaw puzzle.

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Information-intensive management and the expanding market for information professionals

Nick Moore

Professor of Information Management, Birmingham Polytechnic

Paper presented at the 60th Aslib Annual Conference and Exhibition on 19-22 April 1988 at the East Midlands Conference Centre, University of Nottingham.

We live in a consumer society. Most of us make significant, expensive purchases of consumer durables, with, I suspect, increasing frequency. It is interesting to consider the ways in which we go about making these purchases. Generally, there appear to be three different approaches. Some people simply go into town on a Saturday, drift around the shops and buy whatever appears most closely to meet their needs. Or more probably, buy the item which is recommended by the sales person they trust most. Others check through *Which?* and select the item which best meets their needs for the price they are prepared to pay. The third category, and I must confess to being part of this group, buy something on impulse and then, as they write out the cheque, feel a twinge of guilt because they had *not* checked in *Which?*.

The significant thing is that most people even if they do not use *Which?* feel that they should have done. In fact, in the 30 years since it was launched, *Which?* has become the corner-stone in the development of informed consumerism. The journal has over one million subscribers and a great many others consult it on a more or less regular basis. A significant proportion of the population use *Which?* to obtain information on which to base the consumption decisions. It would seem that Adam Smith's economically rational decision-maker has arrived.

In short, we have seen, over the course of a working lifetime, a revolution in the availability and, more important, the use of consumer information. I believe that we are about to see a comparable revolution in the use of information by management. We are moving towards an era of information-intensive management.

Information-intensive management

Some people would argue that managers are already major consumers of information. This may indeed be so in some very efficient and effective organisations but I do not believe that it is the general case. I have always been very suspicious of all those neat decision-making models which show

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little boxes containing the words 'collection of information' and 'reviewing options'. They simply do not appear to reflect the real world. In reality, I expect that most decisions are made on the basis of instinct, intuition, experience, emotion or blind prejudice. Information, as such, has rarely been entered into the equation. There are, however, signs that things are changing.

The National Health Service is a good example. When Roy Griffiths was brought in to perform a management consultancy on the NHS he identified early on that there was a very significant unmet need for management information. In response to this, Dame Edith Körner in her reports made major recommendations that have laid the foundation for the development of management information within the Health Service. As a result, we can see the emergence of an information-intensive management culture within the NHS. Similar developments are taking place in other parts of the public sector.

In the private sector information-intensive management has been a fact of life in some organisations for many years. In most others however, the shock waves of the recent recession have brought about a radical change in thinking. This is reflected in recent work carried out by the Institute of Manpower Studies (Rajan and Pearson 1986). They looked at occupational patterns in the private sector in the mid-1980s. In one of their case studies they looked at a large footwear manufacturer and came to this conclusion:

> 'In the firm, the managerial function had three elements; strategic, tactical and operational. As the names imply the first involved devising strategic corporate plans, the second involved the choice of methods in translating them into action, and the third involved day-to-day administration. Prior to the recession the last element had predominated. Since then the balance had tilted the other way, causing a cultural shock for the older managers, while the firm has had difficulty recruiting managers with qualifications and proven track records in planning and in the implementation of corporate plans.'

In a later study of the services sector (Rajan 1987) they found that organisations were recruiting fewer generalist managers but more management specialists — lawyers, computer experts and information specialists. They found that 'all managers are increasingly required to acquire planning, analytical, knowledge-based and problem-solving skills.'

Job division and job creation

It seems, therefore, that information-intensive management has arrived and I am sure that it will develop in the years to come. It is interesting to observe how organisations respond. There appears to be a discernible learning curve. First, managers are simply given more information to deal with. The idea appears to be that if managers should be making more use of information in decision making then all they need is to be given more information. As the piles of computer print-out mount up in the corners of executive offices the realisation begins to dawn that this is not the solution.

In the second stage someone suggests that they should improve the manager's information handling capability. This usually manifests itself in the cheerful donation to the busy manager of a personal computer. This is not a wise move. Managers are either too busy to learn how to get the most out of the machine or they become distracted by the dubious pleasures of learning how to become computer literate. In the long-term few managers appear to integrate the use of personal computer facilities into their daily work.

Eventually, the realisation dawns that managers are not very good at do-it-yourself information work. People begin to realise that it is more effective and efficient to call in a specialist who can take on the information-handling task. So we see in advanced organisations a process of division of labour whereby the information function is separated from the manager's task and given to information specialists. This process is happening very rapidly in the NHS and there are many signs that it is taking place elsewhere.

Information managers

We discovered evidence of this process in a project initiated jointly by Birmingham Polytechnic and Aslib, the report of which has recently been published (Moore, 1988). The study focussed on information managers as an occupational group and attempted to identify the size, nature and growth rate of that group. We found that it was possible to identify three distinct categories of information manager:

- Librarians and information officers
- Researchers and information analysts
- Information systems specialists

These are not mutually exclusive categories, rather they are identifiable points on a spectrum of jobs within the occupational group. The three categories can be d ifferentiated by reference to the principal characteristics of the tasks they carry out within organisations.

Librarians and information officers are primarily concerned with bringing information into the organisation from outside. They identify and gather information on behalf of the organisation. They also build collections of information in anticipation of future use and they are consequently much concerned with attempting to identify the nature of that future use and the demands which will be placed upon them. Having assembled the collection they then use it to answer enquiries and provide information to their users. They thus handle large numbers of bits of information — books, journal articles, reports, and so on — and they add relatively small amounts of value to each unit. They also handle very large numbers of enquiries — it is not unusual to find librarians and information officers handling between 15 and 20 enquiries a day. Finally, they provide services to a large number of users.

Researchers and information analysts, on the other hand, are concerned with information which is generated within the organisation as well as with information generated externally. Further, instead of assembling collections of information in anticipation of future needs, they more usually collect information in response to particular demands. Some of the information will already be available in published form. Quite frequently, though, it is necessary for researchers and information analysts to collect primary data through small focussed research projects.

Researchers and information analysts handle a relatively small number of bits of information — reports and so on — and deal with a much smaller number of enquiries — it would not be uncommon, for example, for a researcher to work on only 15 to 20 enquiries each year. They do, however, add large amounts of value to the information they handle and they do this by assembling the information, evaluating it, analysing and synthesising it and by re-packaging the information so that it is easily usable by their clients. It is also worth noting that they provide services to a small number of clients — often only five or six people.

Information systems specialists handle data generated within the organisation. They are the interface between an organisation's information system — usually a computerised system — and the management of the organisation. Their primary task is the identification and satisfaction of information needs within the framework determined by information technology. People in this position, therefore, require a high level of understanding of, and familiarity with, information technology.

In many cases, information systems specialists will be called upon to design information systems. They will interpret the requirements of management and work with technical experts to develop the most effective systems. In other cases, the information systems specialist is concerned with the continuous process of collecting, analysing and interpreting the data produced by the system. In this role they deal with a very large number of bits of data and they add value by sifting the data and transforming it into information. They also typically provide information for a small number of clients.

It is important to re-emphasise that these are not mutually exclusive categories of work. Many jobs involve elements of two or three of the categories. It is also important to realise that job titles are merely labels and not necessarily good indicators of the nature of the work. Thus it is possible to find jobs which are clearly in the first category being labelled 'researcher' while many people employed as librarians or information officers have developed their jobs so that for much of the time they are in fact working as researchers or information analysts.

As part of our study we looked at the relative sizes of the three categories. We found that there were approximately 24,000 librarians and information officers. This broadly corresponds with the picture which has emerged from the various surveys of librarians and information workers that have been carried out in the past 15 years. We went on to estimate that there were approximately 10,000 researchers and information analysts and about 4,000 information systems specialists. This surprised us a little. We rather expected fewer of the former and more of the latter. In forming our expectations we had perhaps under-estimated the significant growth in recent years in the number of researchers and information analysts. At the same time the heavy emphasis which, these days, is given to information technology led us to expect more information systems specialists. It is undoubtedly true that there is a very large demand for information technology specialists but the emphasis is very strongly on the technology. In very basic terms what people are looking for is a computing graduate. When the positions are subjected to closer analysis it becomes apparent that the number of positions for information systems specialists where the primary emphasis is on the understanding of information within a technological framework was smaller than we expected.

As part of the study we analysed a broad range of job advertisements for information managers. Using this information it was possible to form a judgement about the relative growth rates of the different categories by assessing the proportion of advertisements for newly created positions. We found, for example, that 15 per cent of the advertisements for librarians and information officers were newly created positions. This is roughly what one would expect from a relatively stable occupational group. In marked contrast, however, over half the advertisements for researchers and information analysts were for new positions and for information systems specialists the figure was over 40 per cent. This represents very dramatic growth. Within any occupational group if more than half the positions advertised have not existed prior to the advertisement it is a fairly safe bet that something unusual is taking place. In our case there would seem to be a very major expansion in the demand for the second two categories of information manager. Next year we plan to carry out a similar survey to assess the extent to which our findings can be validated. In the meantime, regular scanning of job advertisements indicates that there is in fact a major growth in job opportunities in these areas.

I believe that we have identified a major shift in the balance of employment opportunities for information managers. The adoption of information-intensive management and the resultant division of labour is producing a significant employment market for information managers who can work with organisational managers at tactical and strategic levels within the organisation. This development will bring with it real possibilities for career progression through into management at the highest levels. These opportunities will only be realised, however, if we have the individuals with the right aptitudes and skills to capitalise on their positions.

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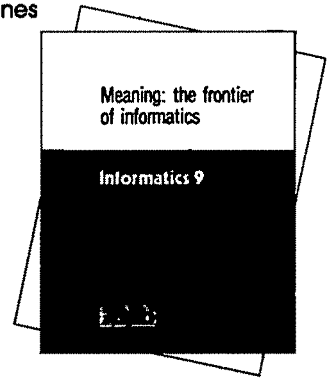

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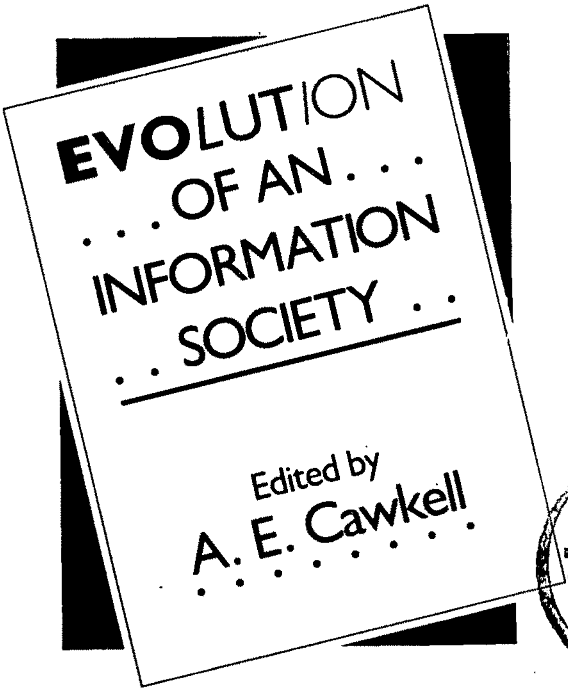

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Keynote paper: trends, probabilities and tomorrow in information technology

Hugh Ryan

Arthur Andersen & Co.

Paper presented at the 60th Aslib Annual Conference and Exhibition on 19-22 April 1988 at the East Midlands Conference Centre, University of Nottingham.

It has become almost a cliché to note that we live in the information age. Yet, despite this, it is, in fact, a key point in looking at our times and business. In the agricultural age, the key product and the shape of society was set by agriculture. In the industrial age, once again, the shape of society and the way we view it and the key product of the age were the industrial products. Thus, this being the information age has a key implication for us in that, if this is the information age, then the most important product of our time is information. This strange product, information, is what future generations will view us by. The production of information will shape our society and the shape of those things we value.

In this age the enterprise faces a key decision. Will it join the information age or choose to live in a past age? The decision to not join the information age is an implicit decision to view the information component of the enterprise as a part of the plant, like air conditioning and heating. The decision to join the age is a decision to change the entire focus of management. It is a decision to 'manufacture' and use information; not sparkplugs or tractors. It is a decision to, in a sense, look not at the enterprise but at the information that comes from within and outside the enterprise and to run the enterprise to drive the information in the right direction. It is a decision to use information technology for competitive advantage.

Of course, this is a difficult change for the culture of any enterprise; very often it is associated with a fundamental rethink of what the business is all about. Yet given the competition we see today in all sectors of business, much of it on a global scale, the survivors will be those that make the change. There are well publicised successes. American Airlines, for example, went through such a re-evaluation a few years ago that it has made them a leader in the airline industry. Speaking from a customer's standpoint, a very frequent passenger, American for a long time thought of itself as an airline company and as such was concerned with airplanes and speed and advanced technology and highly skilled and paid pilots. In their re-evaluation American realised that they were, in fact, a company that collected money from people and in turn put them in an aluminium tube and threw them across the face of the earth. When an airline looks at its business in this way the important thing is that there are customers who give away money to leave one spot to go someplace else. Pilots, engines, airplanes, the things of airlines are not so prominent. The customer, their time, getting to the right spot on time or earlier and money for service are important. And American began to change itself. Suddenly, through it's frequent flyer program, they recognised me, the customer, as the important part of the business. This program could only be achieved with information technology and American did it cleverly and secretly–springing it on the customers and competitors very suddenly and gaining a huge competitive advantage as a result. What is interesting now is that American continues this rethink and we see them moving into areas such as credit cards for the customers. In a sense, American seems intent on eliminating those aluminium tubes, that do take a lot of maintenance, and just collecting money from the customer.

If the enterprise is going to join the information age it needs some key components in place. Fortunately, these components are available. A part of the information age is the need to compete on an international basis. If one is to have information available then the corporation must have the telecommunication capability. This leads to the need to have what might be called the 'wired' corporation, where information in one place is in fact available in all places. We see this today in the companies that work in the international stockmarket where the books of business are moved from one market to the next as the markets close and open. When the corporation is wired, the information must be available. Systems must be developed to track anything that moves that is significant. And it can't be just the general ledger. News sources, financial reports, business and political developments all become information the corporation needs. It must be collected and made available. Such an effort often requires a fundamental upgrade of many of the information systems a corporation has, it is part of the price of competing in the information age.

Finally, the corporation cannot look to information systems groups to determine the information it needs to compete. Information processors are exactly that. They process information, they do not use it. Studies have found that the typical information processor does not work for the corporation that pays them. They work for the company called IBM/CICS/COBOL or ICL/TPMS/IDMS. A change of job for such people is to go from the firm of ICL/TPMS/IDMS to IBM/CICS/COBOL. To go from Greater Prudence and Wisdom Insurance to Hot Stuff Popcorn is a means to obtain a pay rise.

The user of information must take responsibility for obtaining the information he or she needs. To obtain the information, he or she needs tools and directed staff to access and manipulate the information. Such tools are available, we see many of them on the common micro. But the user must make the commitment to learning the tools or building the staff and going after information because he knows what the business is about and where the opportunities and threats lay.

If the enterprise is to make a commitment to join and compete in the information age it must recognise that it is an ongoing commitment that begins with business planning which builds a vision of what the enterprise is about. From the vision that the enterprise builds of itself through business planning information processing must develop a vision of the information architecture that will support the business plan. Then this plan, the information architecture, must be carried forward into developing, implementing, and operating the information factory.

But this building of the information factory from the information architecture is not so easy. There is a remarkable parallel between today's head of information processing and the head of an aircraft design in the early 1900s. Neither is very clear on when and why the wings come off. So, when we speak of information architecture we are speaking of such things as machines, and system software and applications and user needs. The fact is most information processing professionals have great difficulty trying to anticipate and control all the possible interactions of an information architecture. While models are being evolved to help the corporation that chooses to join the information age, there is little question that in building from an information architecture one is on the leading edge and often one is cut on the leading edge. However, the risk is mitigated by good people working in planned disciplined manners who are constantly striving to understand and contain the risk. They must look outside their own experiences at what has and, equally important, has not worked in information for competitive advantage to understand the impact of the actions they are taking today.

All of this is happening against a backdrop of a rapidly changing and maturing information industry. We are seeing increasing vertical integration in the industry with computer vendors, such as IBM, selling services to plan and install application systems. Information consultants are moving into strategic planning to insure that the corporation thinks in terms of the information age as it plans its business. We are even beginning to see planners and consultants and vendors recognise that the thing to sell in the information age is information not the plants that process information. All of this creates a challenge for the enterprise to bet on the right runner to carry them into the information age.

At the same time, there is a huge sunk cost in current systems which economics tells us to ignore but reality will not let us. Studies suggest that the most conservative group in the typical corporation is the information processing group and getting them to change may be tougher than beating the competition. But if the corporation is to join and move forward in the information age this obstacle has to be changed to an ally.

Despite the difficulty of change the enterprise must change or it will stay with the prior ages and become like the passenger ships, a service that is used to be reminded of the good old days. In the successful enterprise the MIS group will become the information broker finding the owner and needer of information and matching them up. The broker role will change MIS to the generator of results and the need for results will see resources in terms of money and new and bright people moving into information processing while it moves to become a part of the enterprise not the processor of information. To take advantage of all this it is important to get the sequence right. Too often in information processing we have a solution and don't know what the problem was. As a result we often throw some technology against the wall to see if it sticks. Also, too often we move to a technology before it is ready and understood, or the vendors are stable. In using information technology do not put the corporation in a position one wouldn't want to be in in five years. There are too many corporations with critical applications running on hardware for whom the vendor is no longer answering the telephone.

Finally, do not implement technology that the DP shop is not able to support. Either the people must be developed as the technology is brought in or we must look for smaller bites. Too many companies have tried to go from second generation systems to today's environment and found only staff departures. But one can get the sequence right. Obviously, begin by a commitment to use information for competitive advantage. Look at the business and ask do we need a different business or can our current work be smarter through the use of information? Look at where you are and where you want to go and try to draw in the bridge with information.

Then look at the technology you need for the bridge. Find those enabling technologies and make the commitment to develop the staff understanding of the objectives and then the technology, so that they may build the bridge. Look at other opportunities and try to see the way to tie the technology together. Too often in using data processing we end up with islands of technology and only slow boats between them. If one person has information it will be of use to others to make sure the integration exists to share it. Finally, once the solution is there, don't just say great and move to another problem. Watch how people use it and then evolve it. The big gains in engineering came not in the initial use of a technology but in the thousand subsequent improvements that make the technology viable.

We do live in the information age. To survive, either one tries to join it or perishes. The technology is there, the desire to compete will harness and direct it to meet the enterprises need; the challenge is in engaging the problem.

The information explosion

Clive Bradley

Director, Confederation of Information Communication Industries and Chief Executive, Publishers Association

Paper presented at the 60th Aslib Annual Conference and Exhibition on 19-22 April 1988 at the East Midlands Conference Centre, University of Nottingham.

I must start by congratulating Aslib on its 60th anniversary. It is a great pleasure to speak at this celebratory conference, and I am even happier that I can do so in a godfatherly way, as representing not only CICI, of which Aslib is a member, but also The Publishers Association. We enjoy a friendly rivalry, with the emphasis on the word friendly, because even if at times our interests do not coincide, there has to be a clear recognition that both the producers and the users of books and information are in the same game together. Indeed, it is a commonplace these days that we are all both 'providers' and 'users' of information, all of us in our industry drawing upon information provided by others and providing our own information to our own customers. It's an unending cycle, and we are in it together, all with the need to maintain the viability and success of the whole operation.

I certainly don't need to remind this audience of the importance of information in our economy. It has been estimated that, together, the British information industries have an output of some £20bn, which is well over 5 per cent of the British Gross Domestic Product. Further, with the stimulus given by new technology and the growing demands of our marketplace, it is a growing international industry, in which the UK has profound advantages—the advantages of course of the English language, but also of fine research industries, of fine writing, excellent marketing of information and superb library and information management services.

It is this industry that CICI—the Confederation of Information Communication Industries—has been established to serve. It sprang from a recognition that, in terms of Government policy, too much attention had been paid to the T side of IT—the technology, rather than the information, and that it was only too possible to develop highly advanced information technology, but to lack the information products and services to use the technology, and the manpower to develop them. CICI's main task is to speak on behalf of these industries. which range from broadcasting in all its forms, the video and audio industries, and the traditional publishing and printing industries, to computing services and information management, to the British Government and to the European Commission. Increasingly, new technologies have caused a convergence of the interests of these industries—which of us does not now rely on computers for processing quite a large part of our output? And we are all concerned with the increasing facility technology provides in distributing information, helping us to select just the extract we need, and providing a copy of it. It is on the opportunities and problems thrown up by this convergence that we speak to Government, to try to formulate the policies needed to assist our industries to grow, to perform satisfactorily, and to make their maximum contribution to the economy. I should emphasise that we are not a trade association providing services to our members. Instead, we seek to determine a consensus of their views, represent them to the authorities, and hopefully secure action. For this, we need the support, in terms of professional and financial input, of our members.

There are a number of distinguishing qualities of our industries today. The first, inevitably, is the rapid rate of change, which means that we are constantly finding ourselves in a dazzling new ballpark before we have become accustomed to the last one, and learnt to maximise its potential. The second, partly caused by the first, is the fact that the potential of the new technologies is greatly underutilised. Although there have been massive developments, it remains relatively rare to earn good trading profits from investment in many of the new products and services, partly because, with the best will in the world, users will still rely on traditional services, benefitting from the lower costs of mass markets and economies of scale, rather than paying the higher costs still involved in many of the new media. For the new media to be profitable, they need to be able to offer considerable added value in resource and convenience of use. But, at some time, we shall pass the point of no return, at the time when the critical mass of the new services provides a greater resource with greater convenience and with smaller costs. Although people have forecast this point for many years, it is quite likely now that, with a new computer-literate generation beginning to run our industries, we are rapidly approaching it.

The third quality is the highly international nature of our industry. When you start sending information by electronics, whether by satellite or by cable, or through old copper telephone wires, it is increasingly the case that the customer will seek information from the best source, whatever the country of origin and, perhaps, whatever language it is in, so long as it is English. Similarly, the information industries need international markets, though it has to be said that the very size of the domestic market, and the technical lead, of the US industries gives them a dominance in many areas which is difficult to compete with. Many European industries already see their market base as being in the US, and treat other countries as an export market. One obvious problem is that the more effort we put in to developing our own products and markets, the more this will merely serve to suck in American products. That is not a justification for protectionism, but it does underline the importance of getting our policies, our products and our marketing right.

Fourth, the new shape of the industry, particularly the international industry, with its requirement for high investment and its long payback periods, inevitably leads to a concentration in the larger companies, able to compete on international markets. With the formation of the Single European Market, this will clearly continue, and, given sufficient competition, is not perhaps undesirable. So, we increasingly have an industry dominated by market giants, with small companies thriving in what are now called niche markets, either providing services to the majors, or filling specialised gaps in the market. The firm in the middle has a difficult time. But this is not an argument for suggesting that the European industry should concentrate entirely on these niche markets, leaving the big picture to the Americans. Again, it emphasises the need to secure balanced industrial development within Europe.

That's a formidable range of special qualities determining our market. Clearly, success will depend on our industries working in the right partnership with our Governments, to establish the infrastructure and environment in which we can thrive. A step was taken towards this in the UK in 1984, when a minister was appointed to co-ordinate the Government approach to our information industries. Sadly, the appointment did not survive the 1987 election, and we now often have the feeling that the British Government's policy towards our industries is a blank sheet of paper. Interestingly, the European Commission has played a much more positive role, producing its excellent work programme for the development of the European information markets, and following this up in quite precise ways. Indeed, it is fair to say that the British Government has devoted the larger part of its available resources to these developments through Europe, but whether this will secure the return for the UK industries that is desirable, in the face of competition within Europe in such a socially sensitive area, is highly doubtful.

But clearly it is the development of the Single European Market that is going to give the most opportunities. The European community now has a population of 350 million people, and is the richest single market in the world. Unfortunately for us, its potential is still limited by language barriers, by the quite profound philosophical barriers between the member states, by nationalisms, which include, whether or not contrary to the Treaty, strong national support for local information industries, based on recognition of the importance of the information industries for national economies and culture, and, of course, so far as the new information products and services are concerned, we are starting from behind, and perhaps lack the business techniques of our American rivals.

But, given the right Government policies, and the right industrial initiatives, this is an area in which the UK can score, and indeed, it is vital to us that we do insist that these barriers are overcome. We have removed the barriers to the imports into the UK of engineering products from Europe; there is no reason now why the other member states should not remove the barriers to the import into their countries of the products and services in which the UK has particular expertise.

So let us look at the elements of the policies we require. It is my personal but emphatic view that, in the information industries, it is not the job of Governments to get over-directly involved in product and market development. We are a democratic society, in which information is primarily a private sector industry, and we will thrive and compete best in a competitive, private sector environment. So the primary job of Government is to develop the infrastructure and the environment on which we depend.

The first task is quite clearly the legal environment, one of the prime tasks of Government. To us, the essence of this is, of course, the copyright system—the system which provides a trading environment for information products, for works of the mind. The copyright system enables authors and disseminators of information to obtain a return on their investment in their work, and encourages the flow of information to the marketplace. We now have a major new Copyright Bill before Parliament, on which progress has been patchy to say the least. If anything, debate has been marked by an inability of our legislators, and perhaps those influencing them, to see beyond their noses, and to implement a workable system that takes full account of the difficulties of earning a fair return from the provision of information through the new technologies, taking account of the ease of access and of reproduction in an uncontrolled environment. I shall be returning to this later on. We also, of course, have the problems of international piracy and counterfeiting, an illegal industry which probably costs the UK some £1bn per annum. We are now making some progress on this major problem, by concerted action, and we have now got the prevention of piracy onto the agenda for the GATT Round.

Also, on the legal environment agenda are such matters as transborder dataflow, rights of privacy, obscenity, advertising controls, the formation of contracts through electronic media, and the like. The Commission has taken the initiative in establishing a 'legal observatory' to progress these matters and it would be good to think that the British Government was more closely involved in this activity. There is also the question of regulation, the question of how far governments should regulate the information industries, and how far the industries should be left free to compete, and, indeed, whether it is possible for standards of regulation to differ between different industries. And there is the whole area of competition law—how far should this discourage or seek to impose control on the increasing concentration of ownership, and how far should it enable the giants to grow, and to compete in international markets.

The second major area is that of Government involvement in product and market development. The Japanese, the Germans, and the French all have fairly interventionist policies in this regard, particularly with regard to such important industries as those concerned with the availability of scientific information. The US and UK Governments are less involved, though the activities of the US Government in making information available to commercial systems, and in buying new commercial systems, has been a major spur to development. Although we have made some advances in the UK along these lines, we are still beginners in the field.

Clearly, the first priority for Government, in the long-term, has to be development of our technology as a whole—the pre-competitive research and development. Since the ending of the Alvey Programme, the British Government's direct support towards fifth generation computers and artificial intelligence, for example, has diminished considerably, the main effort now being put into the European Commission's Esprit Programme. The available money is now being concentrated more on small and medium sized enterprises, which may not accord with the need to develop internationally competitive enterprises, and support for applications has been virtually terminated. By contrast, the Esprit Programme is now going ahead, and seems to be being enthusiastically pursued. The task here will be for UK companies to get at the very least their fair share.

On the market development side, there is a clear role for the Government, which after all controls some 40 per cent of the economy, in encouraging the development of new industries, not necessarily on a nationalistic basis, but at least by helping to create the market which in any case has been so slow to develop. Education and training are obvious examples, encouragement of export is another—CICI has been active in persuading the British Council to establish demonstration centres, and in participating in trade fairs. High on the agenda at the moment is the campaign to enable businesses to audit their information requirements and to become more aware of the contribution these can make to successful operations. Indeed, awareness of the range of products available, and of the contribution they can make, is one of our major problems, to which we are giving high priority.

The third area for Government activity is clearly the manpower and management development area. First, of course, in providing the skilled, trained manpower to design, develop and manage the new information products and services, which can involve a high level of technical and management skills. A good deal of attention has already been paid to this high priority by our industries, in particular through such programmes as ITSP (Information Technology Skills Programme), but there is concern as to whether the university and polytechnic curriculum is developing the appropriate skills. Perhaps just as important is developing a computer-literate generation, in particular through teaching computing in schools, but also through the use of computer technologies for the teaching of the whole educational curriculum. Here, Government has given some support to the acquisition of computers and the development of software, for education and training, but it has been on too small a scale to permit the multiple use required if it is to become a standard part of the teaching programme. Further, the ease of reproducing software has discouraged investment in it by authors and publishers, so that much software used is of educationally low content, and further investment is discouraged. This sort of problem requires a voluntary agreement between the copyright owners on the one hand and the users on the other to secure a fair return, demonstrating the importance of copyright in encouraging investment and enabling a return to be earned on it.

The next area, which is achieving a high place on the agenda, is the development of telecommunications. There are two major lines of development here. The first is the review by the Department of Trade and Industry of the communications infrastructure required after the ending of the present British Telecom/Mercury duopoly in 1990, and in particular how far there should be a concerted effort to transfer telecommunications on to broad band optical fibre circuits, instead of the existing reliance on copper cable, and, if this is to happen, how far it should be left to commercial investment, supported by incentives of some kind or other, and how far it should be a planned national investment. Then, there are the questions of establishing free access to the system, fair tariffs, and fair competition between the telecommunications providers and customers seeking to use their networks. The US Information Industry Association has developed some refined thinking on these issues, and CICI, in its submission to Government on these issues, was able to quote the IIA recommendations on terms of access and use. At the same time, the European Commission has made it a priority to break down the barriers between telecommunications systems within the European Community, to liberalise the structure and the provision of equipment, establish fair principles of charging, and permit access to telecommunications networks on equal terms throughout the Community. Here again, the Commission has established a fairly precise work programme, and while it is controversial, the advantages of harmonised telecommunications systems, and the issues to be resolved, are becoming much clearer.

Then there is the whole area of the financial environment, particularly taxation, including capital allowances, the encouragement of gifts from industry to potential users such as universities, and the complex question of the imposition of VAT on searches of information services based in Europe when it is possible to access similar services in the US and thereby avoid the tax. Finance must also, of course, cover the financial support given by the European Commission and by national governments towards the development of information products and services, and the terms on which this support is given.

The last main area of activity is the socio-economic one—the ways in which the new information technologies, products and services will affect our working methods, our domestic lives, the development of our careers, the economy, employment, work place, education and training, research, etc. This is such a vast shifting area that it cannot be adequately defined, but it clearly is of supreme importance if we are to understand the technologies and the effects they are having on us, and are to optimise their use. Here we can welcome the Economic and Social Research Council's initiative in establishing the Programme on Information Communication Technology (PICT) which has established a network of academic institutions to co-ordinate and undertake research in these areas. Paschal Preston from PICT will be talking about this area later.

Given the importance of all of these developments, it is very clear that Government and our industries need to work in the closest collaboration to establish the objectives, policies, strategies, and tactics in each of these areas. Above all, this means getting the relationship between the public and private sectors right, and we can welcome such developments as the DTI-led willingness of the Government to make Government information banks available to the private sector for exploitation and their consultation with CICI on fair and viable contractual terms. But there is still a major requirement for very much closer co-operation over the whole of this field, and establishing this has to be one of CICI's priorities in the immediate future. Indeed, the nature of current Government policies, with the withdrawal of Government from the commercial sector, makes this particularly important, though it is fascinating to see how far Government emphasis on meeting the costs of the commercial services it does provide, through trading funds, etc., can lead to an expansion of public-sector activity. The latest, and most interesting, development in this area is the

Office of Arts and Libraries' Green Paper on the prospects of charging for library services. Here we can welcome the role of libraries in making information products and services available to consumers in a nervous marketplace, but can still be concerned that the terms on which information products and services are made available could be damaging to private sector investment.

Inevitably, this brings us back to the issue of copyright, and in particular to the issue of how far it makes sense to permit education, research institutions, and libraries to make copies of copyright works to meet the needs of their own users. The new information technologies, from photocopying to electronic publishing, make this much easier, and there is no doubt whatsoever that a very valuable facility is provided as a result. What is important is that the use of this facility should not kill off the golden goose which provides the information products and services in the first place.

The Whitford Committee, established by a previous Conservative Government, laboured for four years on this problem, and came up with a range of solutions. It is highly regrettable that in many areas the Government has rejected the recommendations of its own expert advisers, and has swung so far in favour of users that, in the view of many of us who are closely involved, severe damage will be done to information provision. The provision of published scientific research reports, for example, primarily undertaken through learned journals, must be seriously damaged if each of the main parts of the market for such journals is able, virtually freely, to make duplicate copies to meet the needs of their users. Who in such circumstances would put investment into the original product? But that is the situation which the Copyright Bill now before Parliament confronts us with at the moment.

I recognise that this is an area in which there is argument, to put it mildly, between the authors and publishers on the one hand, and the librarians and information scientists on the other. But, at the risk of being over-blunt, it is important that the information user community should look beyond the ends of its noses, and recognise that however desirable it is to them that they should be able to make information readily available to their clients, it does not make sense to kill the golden goose. For some reason, the idea has gained currency that information is so important that it should be free, when we all know it is a highly competitive and highly valuable commodity.

So, it is suggested, anyone seeking to earn a fair return on their investment in information is hindering the flow of information, whereas in fact they are making it more available, and it is suggested that they are being greedy or unreasonable in seeking the appropriate remuneration. Yet, in a recent newspaper, I read of the commercial companies which have reported increased profits, and which are being acclaimed as a result. All of us, I am sure, want a similarly healthy and viable information industry, and it is not necessarily the pursuit of greed, but of growth, to operate successfully.

But, sadly, the solutions put forward by the Whitford Committee, for example, have been rejected by the user community as being unreasonable and unworkable, although they are being tested in use around the world. Those of us on the 'information provider' side fully accept that the block licensing systems which Whitford recommended, and which the authors and publishers

Business use of information services

Martin Brooks

Director, Information Services, Financial Times Business Information Service

Paper presented at the 60th Aslib Annual Conference and Exhibition on 19-22 April 1988 at the East Midlands Conference Centre, University of Nottingham.

First of all, I would like to add my congratulations to you at Aslib on your 60th Anniversary. It is a salutary thought that whatever we pontificate about now, some very foresighted people 60 years ago recognised that there were specialised information requirements.

The title of my short talk is business use of information services and I will be talking very much as a supplier, recognising that many of you are consumers of such services. My own perspective of the information industry goes back to 1981, and I have to say at the moment, it is tremendously exciting to see the growth in the use of business information. Since the October 1987 crash, I see my colleagues and competitors in more conventional business publishing, suffering the vagaries of advertising and subscription down turns. But users of business information march on and they are a growing army. Now as in information supplier to the business market, we start from a number of first principles.

1. We recognise as an external supplier we are contributing a very small proportion of the total information needs of an organisation—under 10% seems to be the conventional wisdom in most published research.
2. That the way in which users want information varies enormously in presentation, means of delivery, etc. As suppliers naturally we would prefer more conformity.
3. That standards are rising, you the customer *demand and deserve* higher quality and better service—we need higher calibre well motivated staff to provide and, if you like, the management task in commercial information organisations is to achieve the right balance between customers, employees and shareholders.

At the Financial Times Business Information Service, we monitor and check our assumptions by the use of qualitative market research, but most of all, by talking to our customers and potential customers. In fact, we now have a large number of formal customer service staff. I have insisted that my managers get involved deeply in this process.

These days the buzz word in business information is of course electronic publishing. Having been responsible for setting this up on a formal level at the Financial Times, I am very pleased we now have a multi-million pound business with 150 staff. In 1985 there was myself and my secretary; who, incidentally, is now our Electronic Publishing Sales Manager!

Interestingly enough, this growth has not come at the expense of our more traditional paper based services—a good example here is McCarthy Information. We went online in early 1986. We now have a profitable online service with several hundred subscription users and thousands more casual users on Profile. Yet, the paper service and traditional card service users are higher than they were in 1986—and we have created a lot more employment in rural Wiltshire.

An interesting secondary effect of McCarthy going online is that it has brought us whole new classes of users—which neatly leads me on to my second theme of end-users. Our great fear was, electronic publishing would baffle end-users. It is not perfect but it has helped us take a previously City-orientated service to hosts of new users outside our traditional users of banks and stockbrokers. Many of these new users would not ever consider taking a paper service—the reverse is also true, we have had one customer introduced via the online service who decided that he really wanted paper. Many customers take both or microfiche. You can find end-users in organisations that already have information professionals or in smaller organisations without information professionals.

End-users have different requirements—they want more advice on which databases to use and the advent of expert systems is going to help. At least one online information company in the UK—UAPT INFOLINK has gone so far as to purchase an expert systems software house to develop such services—it is also an indicator that the 'box' on the user's desk still has some way to go. Another example of end-user services is the tremendous growth in premium rate interactive telephone services in the last two years. We launched ours, FT Cityline, last December and we have been staggered by the usage. 30,000 calls on a good day for stock market reports, currency, news and share prices. If one translated those sort of volumes to screen based services—and who is to say it won't happen if BT provide a MINITEL type of facility in millions of homes and businesses, think of the effect on the online business. The lesson is clear, a universal terminal (the telephone), a simple flat rate tariff in the market and whole new industry has sprung up in two years.

What we providers of business information are working towards in this expanding market, is integrated services, not just by technology in say an integrated electronic service but across a whole range of services. We want to take the multiple retailers approach and become supermarkets of information where we can spread overheads like computers and sales forces across a number of products and services. So, I think inevitably, the suppliers are going to polarise into big ones—F.T., Reuters, Dun and Bradstreet, Extel, and small specialised ones. A lot of others are either going to get squeezed or absorbed in the market shakeout.

So, as information professionals, you are coping with more end-users in your own organisations—or at least people recognising the value of information, and an increasing accent will be placed on your management skills. Bulk purchasing of information implies you should pay less per unit of information. That means bargaining and it means we integrated service providers will have to respond. We have noticed the trend beginning, and we welcome it.

In conclusion, if one accepts the proposition that I was taught in the Army that 'Time spent in reconnaisance is seldom wasted' or that spending scarce human and financial resources on the purchase of business information about one's customers, competitors, their products and personalities to help make one's business or organisation more profitable or efficient, then I have painted a fairly rosy picture—more usage, more business to we the suppliers, unit costs of information coming down except where there is a high labour cost. However, it is not quite as simple as that. There is still a whole chunk of industry and commerce that seems immune to these arguments and our blandishments—the middle-sized enterprise.

The information business seems to have the City wrapped up, as well as professional advisers, large multinationals, even little P.R. companies. The two-man insurance broker—we can whack them with best advice and the Financial Services Act and pursue them to buy our services, but what about the middle sized manufacturing company with 300 or 400 employees? I have to tell you they are hard going and it is real foot-in-the-door stuff. Many of them just don't want to know. Its a real missionary sell, hard and unrewarding. But we have to get them. They need to appreciate the value of business information. It is gratifying that the DTI under Lord Young have recognised the problem as well, not just for information but for a lot of other professional services. The DTI is using Profile to host its Single Market database and spreading the message that smaller enterprises should use in helping them to come to terms with 1992.

So, in conclusion, business use of information services is growing rapidly both of traditional sources and of the new media. This calls for much greater standards of professionalism from the supplier and growing sophistication from the bigger users. Larger volumes of usage should mean lower unit prices except where the labour content is high, in which case prices will rise. The coming of nationally recognised tariffs combined with easier-to-use systems is expanding the number of end-users for information services dramatically, and I have not begun to talk about satellite broadcasting and other developments which are only months away from reality.

NEW BOOKS

Informatics 9

Meaning: the frontier of informatics

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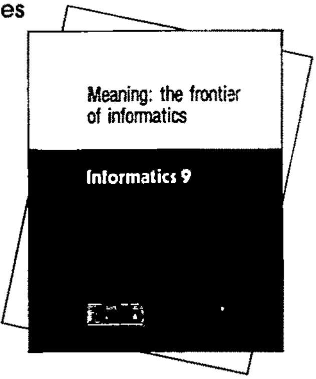

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New information technology has acted as catalyst in the development of our intellectual approach to the concept of information and its communication. In attempting to translate natural language into a language that a machine can understand, it has been necessary to analyse language and its meaning. The exploration of what is fundamental to our social interaction – language – and how this relates to the development of technology is the theme of this conference.

Because of their interdisciplinary nature these papers will be of interest to information scientists, computer scientists, scholars of linguistics and communication theorists alike.

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Research and development

David Worlock

Electronic Publishing Services Ltd

Paper presented at the 60th Aslib Annual Conference and Exhibition on 19–22 April 1988 at the East Midlands Conference Centre, University of Nottingham.

The IT industry in the UK, and thus by reduction the information content-orientated industries which create the services and products used in the IT environment in homes, laboratories and offices, live in highly competitive times. The information industry is by definition a global industry, and increasingly the research and development of new products is seen upon a global basis. The continued development of a world communication system, with satellite links between concentrations of product and service implementation, ensures that this is the case. The major information economies of the USA and Japan strive for leadership in this environment. While not competitive in that league, the UK information economy is examined by government and industry alike to ensure that we have in the UK what it takes to establish a large indigenous information industry, creating high levels of information service employment and creating considerable export potential. Yet, while the American Information Industry Association (IIA) has recently appointed a Director of Globalisation, the UK industry remains more on the defensive than the offensive. Research and development activity has plateaued in most sectors and fallen in some, while government contributions overall are planned to fall dramatically. There was never a better time to look at the future of the information industry: research and development is the key to that future.

What does the UK require to compete in world information industry marketplaces? It has often been remarked that we have in the UK a long and distinguished publishing tradition, and high level editorial and marketing skills. We also have strong traditions in information storage and retrieval through pioneering work in both the scientific community and the development of information systems for librarians and information scientists. There are probably three major sectors, however, which are critical to Britain's competitive position in the world information economy and to its ability to exploit its traditional and its newly-developed skills. These are:

1. *Infrastructure development.* It can be argued that in order to create an export marketing base, the UK must fully exploit its internal economy. To many commentators this means creating a communications infrastructure which encourages British enterprises into the domestic marketplace and makes information acquisition and communication ever easier for commercial and domestic users. The Department of Trade and Industry recognised this

requirement when they established a working party to look at futures in broad-band communications. CICI in return have established a sub-committee in this sector which has already provided evidence on the regulatory environment required to establish the appropriate future telecommunications infrastructure. The issue remains one of outstanding importance.

2. *Skills.* There remains intense concern within the information industry on the speed at which IT-orientated graduates and school leavers are being produced, and upon specific skills shortages in areas of technical innovation and deployment. The National Audit Office, in its recent review of the Alvey Programme for Advanced Information, reported that skills shortages had occurred in more than half of the 42 projects they investigated. These had led to substantial delays, withdrawal of partners, and employment of foreign imports or an overseas university in three projects. The Alvey Committee had considered that the number of information technology graduates was wholly inadequate from the start, but the report indicates that the situation has barely improved, in spite of government measures to try to increase the numbers. This area is also a critical area of developmental difficulty for the industry.

3. *Research and development.* This critical area is of concern to the industry on two counts. In one scenario, UK products and services companies see themselves as the licensees of technologies substantially developed outside of the UK and EEC, and often as licensees of UK and European technologies through American intermediaries where the lack of development within the UK market was a disincentive to technical exploitation in domestic markets initially. They feel on the one hand, that this process will inevitably raise the price of implementation, while on the other it could encourage the trend for US companies, operating in a 'globally networked' world, to see the UK and the EEC as an overspill market, where local licensing for local market exploitation was replaced by the spinning of more and more information products and services from central sites in the US or Japan into peripherally networked European markets. This would not only have an adverse effect upon local IT employment and retard the development of European information economies, but it would also generate a spiral of decline in research and development itself. And, industry critics would claim, in making their second major point, such a spiral of decline is exactly what should be avoided. The European IT economies must have research and development leadership in some defined areas, even though they know that they are unable to compete across the board in every single market sector with the USA and Japan. If the UK is to be able to form consortia with other European nations, or with these information mega-economies, then some sub-sector leadership in some specific areas must be on the agenda to allow 'trade' to take place prior to technology sharing. The UK information industries place the greatest stress on the importance of these consortia developments.

These considerations form the background to an examination of the UK's current position and forward prospects in the research and development field.

The UK information industry in research and development

At first glance it may seem slightly surprising that research and development spending should of itself be a subject of debate. The UK spends a broadly similar proportion of GDP on total research and development as its main rivals (although since their economies are larger, they are spending higher sums in aggregate). Industrial R&D spending in the IT companies has always been high, and remains so. Even in the information industry products and services divisions, companies like Reuters assert that 26% of revenues are ploughed back into new product R&D. If this is exceptional in this sector, where most companies in the publishing and information provider sides of the industry spend remarkably little on research ('every product launch is a test-drive, every book published brings the next one closer to the mark. . .'), then the situation has certainly not deteriorated sharply in recent years.

What is marked about the UK information economy is the effect which we can now register of being slowly overhauled in these activities by our competitors. The fact that other economies have been employing greater numbers of R&D staff more intensively is beginning to tell in this sector. Figure 1 indicates this general trend. Figure 2 indicates that in the government sector, in comparison with other European nations, our R&D emphasis has been clearly assigned to the military wing. It could be argued that over a period of a decade this, again, has had the effect of diminishing our hold on key research sectors.

	1965	1975	1982
France	43	65	80
West Germany	61	104	130
Japan	117	255	320
United Kingdom	50	80	100
United States	494	532	717
USSR	521	1061	1340

Source: European Patent Office 1985 (Jacques Michel)

FIGURE 1: *Scientists and Engineers in R&D*

Yet, the pattern and requirement is clearly changing. John Fairclough, the Government's chief scientific adviser, introducing the 1987 report from which Figure 3 is abstracted, noted that industrial R&D spending was continuing to increase, but levels were still too low. The West German government provides £1,000m more per annum in government support than the UK, but spends only a quarter as much (Figure 2) as this country on defence. Twice as much German research activity goes into advanced industrial production and technology. And

	FRG	France	Italy	Holland	Belgium	UK	Other	Total	EC
Exploration, exploitation of the earth	118	86	27	6	9	82	7	334	5
Infrastructure, general planning of land use	107	182	24	43	9	55	9	429	2
Control of environmental pollution	175	28	22	28	8	52	6	319	18
Protection, improvement of human health	169	232	99	22	26	167	16	731	14
Production, distribution and rational utilisation of energy	703	458	425	41	27	206	19	1879	188
Agricultural production and technology	110	207	82	42	23	213	54	731	9
Industrial production and technology	787	710	446	94	39	308	76	2460	90
Social structures and relationships	128	150	23	34	18	55	19	427	2
Exploration, exploitation of space	217	330	153	23	23	84	9	840	3
Research financed from 'GUF' (a)	1749	697	469	421	127	670	108	4240	—
Non-orientated research	634	842	163	90	40	299	50	2117	5
Other civil research	5	97	13	39	23	12	1	190	—
Defence	664	1829	215	28	1	2379	3	5118	—
Total	5564	5847	2163	911	373	4582	377	19816	337

(a) General university funds

Source: Cabinet Office Report: Government-Funded Research & Development 1987

FIGURE 2. *Government R&D spending in European countries 1985 (£m)*

this is not the only challenge. In a recent address to a Conservative Bow group conference on Exploration of Science & Technology, Robb Wilmot, one of Britain's most experienced IT development managers, commented:

> 'The best R&D teams are getting products to market in half the time and a third of the cost of the industrial average, and of course in high tech a major portion of life cycle profits is made in the first six months. Already, some companies are experimenting with 24 hour R&D, shifting CAD files across time zones, just as the world's finance markets now operate.
>
> Toshiba is a fascinating case study. 10 years ago they were not in the semiconductor business. Now they are within 2-3% of being number one. Their entire strategy involved being eight to 10 weeks ahead of their major competitors on industry milestone products.
>
> The IT industry, despite its tremendous pace of change, has been highly predictable, so a strategy based on R&D effectiveness is highly appropriate.' (*Independent,* 8.3.88).

Total spending (£m)	1981	1985
	3793	5146
	4873*	5146*
Sector (1981 index)		
Chemicals	100	120
Mechanical	100	75
Electronics	100	111
Other electrical	100	88
Aerospace	100	86
Vehicles	100	160
Other manufacturing	100	93
All manufacturing	100	104
Non-manufactured	100	124

* 1985 prices

Source: Cabinet Office Report: Government-Funded Research & Development 1987

FIGURE 3. *Industrial R&D* (Funded jointly by Industry and Government sources)

It is in this environment that the Department of Trade & Industry, the major concerned government body in this sector, recently reviewed its own role and position. Obviously, R&D is not the sole issue at the heart of the January 1988 White Paper 'DTI—the Department for Enterprise' (Command 278). Yet to the

IT industry, and thus to information content-orientated sector, the section on research and development funding was of vital importance. In its conclusions, the DTI rejected the continuation of the Alvey programme sought by Sir Austin Bide's IT '86 Committee. Rather than move into a sequence of applications-orientated follow-up programmes, with budgeted costs of some £450m, the Alvey programme was set aside, and the Alvey group renamed the 'Information Engineering Directorate'. Instead of Alvey, the UK government moved to endorse the second phase of the ESPRIT programme put forward by the European Commission, at a cost of £200m with a further £29m going to complementary projects in the UK over the next three years, and £55m allocated to the SERC over five years for academic research. Indeed, the entire emphasis of DTI activity in this sector has moved from support for innovation (the title of one of the now abandoned programmes) to market orientation. 'Companies themselves' said the White Paper, 'are best placed to assess the balance of risks and rewards of their own projects in open and competitive market conditions'.

As a result, the major DTI programmes of concern to the IT industry are now those programmes which support market development. By providing consultancy services and supporting the use of technologies as competitive tools in the IT user base, these policies will stimulate demand for both UK-derived and imported information industry products and services. At the same time, government sets a high priority on obtaining collaborative ventures, particularly in an ESPRIT environment, as the key to enhanced European competitiveness.

It would seem from the current situation, therefore, that industrial spending is fairly static, government spending is in net decline, and university funding is even more tightly stretched. The overriding emphasis appears to be upon pure research in the IT and information fields, with strongly pre-competitive and collaborative research activity stressed at the cost of any applications-based development work. The job of bringing products to marketplaces, whatever the scale of operation involved, is clearly seen to be the entrepreneurial task of the private sector.

Research & development: where do we go from here?

The industry perception of current Government policy on research and development, and of the research and development requirement as a whole, is very mixed. A number of generalisations might, however, be made:

1. CICI has expressed strong support for the Government line, made clear in the DTI White Paper, that a market-directed policy is essential. Shifting the emphasis of DTI away from support and sponsorship and into market orientation makes clear sense to the industry as a whole, and receives widespread support. In this connection, however, CICI asks that Government be clear that UK-derived products and services are available within the information economy to fulfil the requirements created by widescale awareness policy deployment in areas such as financial services.
2. CICI have also been strong in advocating policies that left major initiatives in research and development definition to the industry. The results of Government policy in abdicating a support role will, however, not be seen

in success or failure terms in the short run, and CICI members vary in their definition of 'pre-competitive'. It is certainly true that for many CICI members the type of applications-based projects defined in IT '86 were not 'too close to the market' but were rather more concerned with the phase prior to product development.

3. CICI has strongly supported the consortia concept, believing that only by concentrating technological research resources within market leading companies can essential strength be created. The fact that this will be related, through ESPRIT, in an entirely European context, means that a number of artificial consortia may be created and that the timespan required for effective collaboration amongst different language groups and research cultures may be longer than would be ideal.

If there is more applause than criticism in this critique, it should not disguise the fact many CICI participants feel that there are major gaps in the industrial and government framework of research and development activity. These might in particular be seen the following terms:

1. *The bridgework projects.* If the Government now desires to concentrate its attentions on pure research activities, and if industry develops its own work primarily in market-based applications, there is a fear in some quarters that important transfer or bridgework activities between academic research fields and market deployment can be left high and dry. This work, which is not pre-competitive in the sense that Government now uses the term, is certainly not product orientated. It depends upon bringing together several different techniques and findings from pure research into an applications-based environment. Insofar as projects of this type were foreshadowed by the IT '86 recommendations, or were supported in DTI's previous Support for Innovation work, a valuable contribution has been lost.
2. *Encouraging R&D.* It will be seen from the above that the key priority is to increase IT and information industry private sector expenditure on research and development. The DTI White Paper is short upon suggestions as to how this might be done. One method canvassed by a number of CICI members, and noted favourably in the NEDO report 'IT Futures. . .IT can work', concerns statutory disclosure of R&D funding in company financial reporting procedures. There is widespread agreement that serious steps must be taken to discourage the view on the Stock Exchange or within the investment community that high levels of R&D expenditure are discreditable to a company. In contrast, we have to produce a counter-culture which argues that only companies with high levels of R&D expenditure are making an effective contribution.
3. *Technology and information transfer.* If military research and development expenditure is the dominant feature of the UK pattern of spending in this field, then technology transfer of commercially available IT products and services becomes very important in this sphere. Government clearly recognises this, and the establishment of Defense Technology Enterprises

Ltd with private sector interests is a clear manifestation of concern. Similar arguments could exist in other Government activities, and, more particularly where the interests of the information industry are concerned, in the transfer of information resources into the private sector for industry re-utilisation. With heavy support from CICI, Government made initial steps in this direction with the promulgation of a Government-held tradeable information policy in 1985. CICI would not seek a greater concentration of effort on IT technology and information transfer across the board.

4. *IT skills.* As the audit criticism of the Alvey programme cited above indicates, the IT skills question simply will not go away. It is integral to the research and development question, and must be included within the same frame of reference.
5. *Simulating the economy.* A market-directed policy by DTI is warmly received by CICI, but viewed from an industry point of view, Government is itself a major sector of the market which requires stimulation. The use of procurement to new technologies in a base market, to aid transfer of technologies and information and resource market development arising from private or public R&D, remains a potent force. Government as a test-bed for the products of the UK information industry, rather than as the last possible user when all other market opportunities have been exploited, remains the aspiration of many CICI members.

The above five points indicate the practical linkage made by CICI between research and development trends and priorities and market development realities. It is an area where success will be measured by the existence of an independent and viable UK information industry: failure means the reduction of the UK industry to a dependent role in the distribution of information technologies, products and services created elsewhere for UK consumption.

Social and industrial innovation and policy change

Dr Paschal Preston

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Paper presented at the 60th Aslib Annual Conference and Exhibition on 19-22 April 1988 at the East Midlands Conference Centre, University of Nottingham.

In this paper I want to examine the scope and limits for a major shift in the internationalisation of trade in information and communication services (or 'tradeable information' markets) by the close of the present century. I will seek to relate together some of the key socio-economic, policy, institutional and other factors which, in interaction with new information and communication technologies (ICT), will influence the form and extent of transformations in the structure and spatial scale of information services markets. Thus, the focus of the paper is on some of the key issues related to the *globalisation* of information and communication (IC) services markets associated with the development and diffusion of new ICT. My discussion is strongly influenced by the British industrial, policy and research context where the potential for the development of international trade in information services has become a matter of increasing concern to industrialists and public policy makers in more recent years (eg ITAP, 1983).

Muddled models of new ICT and current structural economic change today

The issues surrounding the question of the nature and implications of new ICT for the increased globalisation of trade and markets is an increasingly popular topic. It is a research topic where one is inevitably confronted with a wide body of academic and policy research literature addressing a very diverse set of issues and topics. These range from concerns with what is happening and what is deemed likely to take place as a result of the development and diffusion of new ICT to work addressing the specific characteristics and development of IC services and markets and policy issues.

In particular, I want to criticise one influential vision of the forms and extent of globalisation of trade information services associated with new ICT. This model can be found in a number of overlapping sets of literature in the social sciences, consultancy and policy research fields. This suggests that the implications of the development and diffusion of new ICT amount to a second industrial revolution which will mark a radical departure from the socio-economic structures and relations which have prevailed since the early 19th century in countries such as Britain. This model also suggests that new ICT will lead to a major growth in the international tradeability of IC services in the next 10 to 20 years. The model projects that such structural shifts will lead to a significant growth in the share of wealth and job creation based on tradeable information services located in the British economy. It suggests that the characteristics of new and enhanced communications networks will dramatically increase the international tradeability of IC services and bestow major advantages and potential for British firms to produce, control and deliver these services remotely to other overseas markets.

In what follows, I want to argue that these views and models of the implications of new ICT greatly exaggerate the potential international tradeability of most IC services. They also exaggerate the likely potential benefits of tradeable IC services in terms of wealth and job creation in Britain.

My argument is partly a theoretical and methodological one. It concerns the vast differences that exist between the scale and structure of physical space and the much more complex socio-economic and institutional spatial structures in which the market and industrial shaping, application and implications of new ICTs are actually realised and harnessed. But is is also one with important practical and, indeed, commercial and industrial implications. In contrast to the idealised and utopian approaches, my preferred perspective is partly an historical and empirically based one. It is informed by an understanding of the actual pace, pattern and influences acting on the development and diffusion of major new technology systems in the past and their implications for socio-economic change and the spatial reordering of economic relations (Preston, 1985a; Hall and Preston, 1988). It is also partly based on the evidence and experience of new ICT-based innovation in information and communication services markets in more recent years, where the limits and high costs of technology-led approaches have dented the budgets of a number of investors and entrepreneurs. Thus the perspective adopted here stresses that we must be wary of repeating the costly mistakes involved in any attempts to impose a narrow technology-led view of the likely impacts and implications of new ICTs for innovation and the spatial restructuring of markets and industrial structures.

The historical significance and specificity of new ICT

A major problem is that the utopian views tend to define and conceptualise the significance and implications of new ICT in terms of a new industrial revolution. This is partly because they have a very poor and partial understanding of the actual historical development of technological change and its implications for socio-economic and geographical change. This approach fails to take account of the nature and implications of previous major and pervasive new technology systems since the industrial revolution. It lacks any historical understanding of the patterns and shifts in technological change that have occurred over the past 200 years. As a result, it tends to greatly exaggerate the demise of existing economic, social and spatial structures and the scope and potential of the likely major structural changes associated with ICT as a major new technology system.

In my view, the most fruitful starting point and model for analysing the implications of new ICTs starts from the long waves perspective on the nature of technological and socio-economic change since the industrial revolution. This approach was adopted and elaborated by Schumpeter and refined further in more recent years by a wide set of researchers (see Hall and Preston, 1988). This approach takes explicit account of the existence and implications of previous generations of major new technology systems (eg railway and electrical networks) for economic and geographical structures. This permits a much more realistic assessment of the significance, meaning and potential implications of new ICT compared to the historical utopian analyses. It provides the basis for an analysis of both the continuities and the discontinuities in economic and spatial characteristics of markets associated with the emergence and diffusion of new ICT compared to the views advanced by the utopian school.

The interaction of technological and socio-economic change

An important problem with the writings and analyses, which suggest a major expansion in international trade in information services associated with new ICT, is the tendency to read-off and project socio-economic and spatial change from an analysis of the inherent characteristics of the technologies. In crude terms, it is often claimed, for example, that because new ICT has the technical capacity to transport many new types of information from one point to another, then this will lead to increased tradeability of IC services. This approach involves a type of technological determinism which fails to take account of the important relationship between technological innovation and social, economic/industrial, institutional and organisational innovations.

In contrast, the historical-rooted long waves approach provides an important analytical framework for both understanding the reciprocal relationships between technological and socio-economic innovation and other aspects of change in the past. It also provides an initial framework for the analysis of the possible patterns of change in these relationships associated with new ICT in the present era which is much more helpful than the naive utopian approaches.

The example of international trade trends in manufacturing

A simple empirical example may serve to illustrate the main point that I wish to make: that the existence of appropriate new technologies is not in itself a sufficient condition to mean that there will be an increase in the international trade. The example I have chosen refers to development of international trade in manufacturing goods markets throughout the 20th century. The last 80 years has seen a steady stream of technological developments and other improvements in the means of transportation of physical goods. There has been a stream of successive innovations which have both improved the reliability as well as reducing the relative costs of transporting goods across the globe. These however have not led to a linear growth in the role and importance of international trade in manufactured goods over time in keeping with the considerable pace of technical advance which a crude technology focused (determinist) model would suggest. Instead, we find that the available indicators show that between 1913 and the early 1960s, international trade in manufactures in the UK and in the economies of the 12 major advanced capitalist countries actually declined in importance compared to earlier years. It was only from the mid-1960s that the relative role of international trade (as measured by the important content of total supplies of manufactured goods) began to match and surpass its role in the pre-world war one era. The reasons for this 50 year decline in the role of international trade were economic and political; they were to do with the rise of 'protectionism' and restrictive international trade policies on the parts of governments in the interwar years (especially after the 1929 crash) and with the disruptions caused by wars. The reasons for the increasing role of international trade from the 1960s were also largely political and economic rather than the result of technological breakthroughs; they include the establishment of the GATT, IMF and related international economic policy institutions and regulatory frameworks in the postwar era.

Having illustrated the importance of the political and economic influences (as opposed to the purely technological factors) on the changing role of international trade in manufacturing markets we will now examine how these influences might restrain the role of international trade in services (despite the apparent potential of new ICTs to increase the international tradeability of IC services).

The dominant non-technological shaping influences on the globalisation and tradeability of services

There is no doubt that innovation has led to the enhancement of traditional international electronic communication networks and the availability of technologies for the development of much more sophisticated and integrated international communications networks.

However, it would be a mistake to leap to the conclusion that this will directly lead to a significant increase in the globalisation of information services markets—at least in the form of delivering services remotely to overseas markets. This is despite the optimism in much of the literature about the enhanced international tradeability of information services as a result of new ICT. In this section, I want to stress some of the considerable economic, political and institutional structures and interests at play which indicate that this might be a much more limited phenomenon than is often suggested.

Thus, here I will apply some elements of the approach to technological change and its relationship to socio-economic change and institutional innovations outlined earlier. I will do so by indicating some of the non-technical factors and influences which are likely to shape the development, use and implications of new ICT-based international communications networks. These suggest rather more complex scenarios and limited potential developments in the globalisation and international tradeability of information services than that originating in the literature more strongly focused on the abstract or inherent characteristics of the new ICTs and which reads-off their implications for the international tradeability of most IC services.

The economic and industrial characteristics of information and other services

In order to assess the implications of new ICTs for the international tradeability of information and other services it is first of all necessary to define and address some of the specific economic characteristics of these different kinds of services.

One of the ways in which economists have traditionally defined services is that their production and consumption/sale must take place simultaneously or in the same place (the non-storability factor). This does not apply to all service activities but it does apply to some (e.g. cleaning and other personal services). It does, however, suggest that only some services activities can be produced in one country/market and delivered ('remotely' as it were) to another. Clearly this restriction is not inherent in certain information services (e.g. packaged software; online databases, other electronic media based information services (music, TV programmes and films) or print-based information services.

The IC sector today is very often defined very broadly to embrace a very wide set of services with many different characteristics and many of which are unlikely to be deliverable or tradeable remotely even by the most sophisticated new ICTs. In order to assess the potential tradeability of various information services it is useful to examine the characteristics of each constituent information service. This includes taking account of whether the information is embodied in persons, embodied in capital, or non-embodied (a typology originally suggested by some of Machlup's pioneering work in this field).

In the case of management consulting, accountancy, brokerage, advertising, etc services, for example, the scope for expanded international trade is quite limited. A consideration of the characteristics of the actual information gathering and processing functions involved, and of the related communication processes, makes it very clear that some degree of physical presence of the labour involved in providing the service must be located in the 'importing' markets. Thus, new technologies are unlikely to stimulate the international tradeability of many producer information services (e.g. the professional and business consultancy type services) which constitute a major and rapidly growing element of conventional definitions of the primary information sector. Hence we find that in many of these services, the dominant form of globalisation in recent years has taken the form of international investment in setting up or buying subsidiaries rather than delivering services remotely from bases in the domestic/home country market. There appears to be some scope in these services however, for combining overseas investment in setting up establishments in 'export markets' with producing some of the exported services via labour based in the domestic/home market. But the precise form and extent to which this occurs will be determined primarily by the plethora of regulatory and other policy frameworks currently being planned or negotiated in a variety of international policy arenae.

Another constraint on the potential 'tradeability' of certain services—and one that is all too often overlooked by utopian and other post-industrialism theorists—is that they are closely linked to manufacturing and other material production activities in national/domestic markets. Thus it is necessary, (but not easy) for analysis to distinguish further between such 'tied' and 'stand-alone' services. Besides, the available evidence on the international flows of information and data across national boundaries suggests that the bulk of it does not relate to traded information services at all; rather it concerns the intracorporate flow of information between different constituent units of transnational corporations.

Thus, when one carefully analyses the key characteristics of the various IC services only a small proportion of the total appear to have a significantly enhanced potential for international tradeability given the emergence and development of new technologies and networks. Amongst those that have such an enhanced tradable potential are those which are by now very familiar to you as information service managers; examples of these include: electronic databases for specialised scientific, technical and economic information and the growing set of new enhanced or downstream information services aimed at commercial, professional, and academic work-based users as well as the less dynamic set of new information services directed at final and leisure consumption. Here the success of British-based new IC services such as the Financial Times and others such as Reuters indicate the real international market opportunities that exist given the particular characteristics of their products and markets. But it would be a mistake to draw conclusions, based on the achievements of these particular services, which are deemed to be generalisable across the bulk of the IC services sector.

The political factors influencing and constraining the international tradeability of services

Having pointed to some of the political and economic influences on the development of international trade in manufacturing markets earlier we must now take account of the political factors influencing the growth of international trade in services. The first and essential point to make is that all services markets are universally much more highly regulated and protected by national government policies and subject to political shaping than are manufacturing or many other material goods markets (see Table 3.1). In the case of many IC service markets, the degree of regulation and protection is even more pronounced than for other services. This is partly because many governments regard these as strategic services and industries and in many cases they do so to an increasing extent. It is also partly because some cultural IC services are protected for reasons of national culture (and besides the boundary between 'cultural' and other (producer) information services is often a very blurred one).

In recent years, many different international policy making organisations have become involved in seeking to reduce the considerable range of national regulations and barriers to more open international trade and other transactions in IC and other services. These include the OECD, IMF, UN, GATT, International Chamber of Commerce, World Intellectual Property Organisation, International Publishers Association. Here also one must include the International Telecommunications Union and various other international organisations concerned with technical standard setting. The latter are nominally concerned with the many problems associated with conflicting technical standards which constitute real barriers to the enhanced globalisation of communication services. But these discussions also overlap with important socio-economic stakes and issues (Melody, 1986).

Clearly, some significant progress has been made in terms of resolving conflicting standards and regulations at the more technical end of the policy issue spectrum and thus facilitating the construction of more open international networks for voice and data traffic. But in terms of the international

TABLE 3.1. *State policies relating to international service activities*

A) Measures of a general nature
1. Foreign exchange restrictions
2. Government procurement policies
3. Government incentives (particularly important in transportation, film, computer services sectors)
4. Measures affecting investment
5. Restrictions on the employment of non-nationals
6. Differential taxation of foreign enterprises

B) Measures affecting particular service industries
1. Trade related measures (these particularly apply to: advertising services, insurance, banking, maritime transportation, air transportation, cinema/films, computer services, imports of service related goods)
2. Investment related policies controlling the establishment of foreign companies (these particularly apply to: banking, insurance, construction and engineering, accounting, legal services, cinema/film distribution, franchising services)
3. Investment related measures controlling the operations of foreign firms (particularly applies to: banking, insurance)

Source: UNCTAD (1985) Production and trade in services: policies and their underlying factors bearing upon international service transactions (New York: UN)

standardisation of the equally important economic policy standards and regulations most directly related to IC services, there has been much less progress.

The single most important forum here is the current GATT round of meetings. Here there continue to be very major differences in approach between the participating countries. For example there has been a marked failure to make much progress on resolving the big difference that exists over the conceptual innovations and policy frameworks that some of the advanced industrial economies regard as critical for the opening up of global markets for IC services. There appears to be little by way of consensus over such issues as 'right to establishment', 'right to interconnect' and especially 'right to non-establishment'. Part of the problem is precisely that many of the proposed new conceptual and policy innovations or standards being proposed at the GATT are deemed to have very little to do with international 'trade' as conventionally understood and defined. In the views of many participant governments, they have more to do with the internationalisation of capital (investment and factor flows rather than trade flows).

Despite the lack of open reporting of these proceedings, informed opinion suggests that the significant differences between different national regulatory and other policy standards are much more complex than a simple divide between the less developed and the advanced industrial economies. Whilst political forecasting might be equally as risky and unreliable as technological forecasting, the current evidence suggests that the vision of open and free trade in international IC markets does not seem a likely scenario for the 1990s or early years of the 21st century at least.

Conclusions and implications

This has been a necessarily brief and selective review of some of the key factors influencing the potential for increased international trade in information services. It has sought to critically examine some of the implicit and explicit assumptions informing private and public sector decision-making in this area. I have touched upon some of the theoretical and analytical problems related to the role of new ICT that underlie many conventional approaches and assumptions concerning the potential tradeability of IC services. I have also touched upon some of the economic characteristics of IC services and some of the barriers and problems related to the establishment of international policy standards and frameworks related to the potential expansion of trade and markets in this sector.

In the limited time and space available here, it has not been possible to consider some of the more concrete issues related to the specific position of, and implications for, the British IC sector. For example, it has not been possible

In the limited time and space available here, it has not been possible to consider some of the more concrete issues related to the specific position of, and implications for, the British IC sector. For example, it has not been possible

to examine the nature and extent of competitive advantages and potential strengths of the various existing IC service industries in Britain. It is now clear that British industry appears to have a particularly weak international position in the ICT supply industries and markets (Hall and Preston, 1988). There is some crude evidence to support the claims of a relatively strong and competitive international position in some of the existing IC services markets, although US firms have dominant positions in many of the new enhanced telecom-based services (e.g. Preston and Melody, 1988). But the extent to which existing IC service strengths and potential can be translated into actual performance in new and growing international markets depends upon the appropriate mix of private sector innovation and investment policies as well as supportive public policies across a range of policy fronts.

Nor has it been possible to explore some of the other key economic characteristics of existing IC markets. Here, for example, one can point to the prevalence and tendency towards increasing monopoly or oligopolistic market structures and the inappropriateness of policies based on models of free and atomistic competition between many economic actors. As indicated earlier, these are highly politicised markets and industries, which are crucially shaped and constrained by national and international public policies, shaped by the role and advocacy of various national governments in line with the perceived interests of 'their own' particular TNCs.

I have argued that the prospects for a massive expansion of the level and significance of internationally traded information services is likely to be much less than portrayed in many popular accounts and which inform many current discussions of these issues. Despite the development and application of new ICTs there is likely to be relatively limited expansion of international trade and markets in IC services in the medium term future (apart from a few specific packaged information services). Thus the general scope for direct job and wealth creation via international trade is much more limited than is often assumed within countries with competitive strengths in these areas. Thus the opportunities for expanded trade and open markets in the IC services sector are likely to be limited at the global scale, according to the analysis offered here. This conclusion serves only to underline the importance of actively promoting the creation of a single European market for those national industries and governments whose interests lie in expanding the scale and level of international trade in IC services.

Here, too, it is important to recognise that the creation of a larger scale and single market (embracing a dozen countries with very different socio-economic structures and strengths, industrial and cultural policy priorities related to the IC sector) is not going to be easy nor will it automatically develop alongside technological changes. There are indeed many outstanding problems to be resolved before common technical standards, competition policy and other regulatory frameworks can be established to create a single market embracing 320m people. But in terms of the factors influencing the spatial expansion of markets and trade in IC services examined earlier, this objective is much more likely to be achieved at the EC scale than at the global spatial scale.

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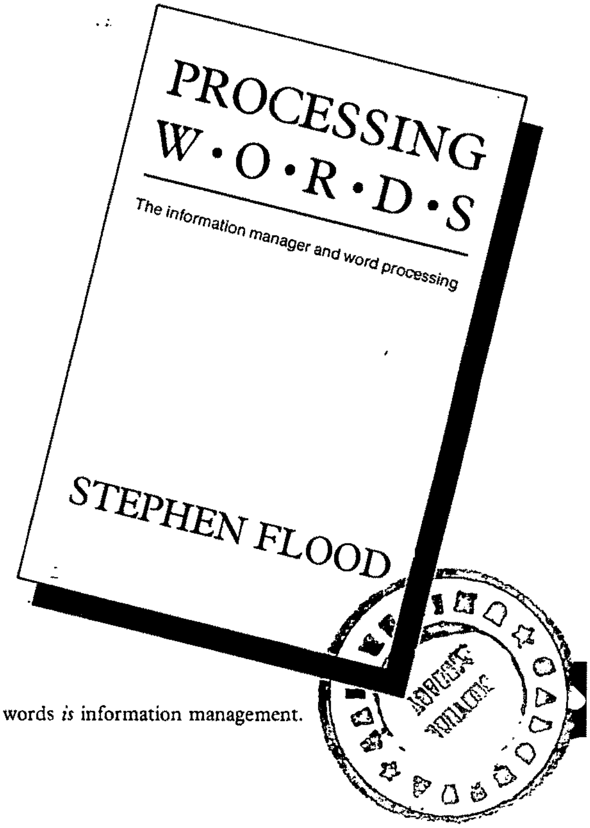
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The rhetoric of promise: advertising in the information industry

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Advertising as an agent of change

During the First World War, the Creel Committee, set up by President Woodrow Wilson, used the powerful weapon of advertising to disseminate information and shape public opinion. Creel promised Wilson 'a plain publicity proposition, a vast enterprise in salesmanship, the world's greatest adventure in advertising'[1]. This campaign, with memorable adverts such as Courtauld Smiths' Red Cross poster, 'The Greatest Mother in the World', and James Montgomery Flagg's self-portrait of Uncle Sam declaring 'I want YOU for the US Army'[2], was a great success for advertising technique and enhanced the status of the tyro profession. It also showed how effective advertising could be in persuading and swaying mass opinion. A 'Printer's Ink' editorial of 1917 clearly shows that the relationship between advertising and control has been, perhaps for the first time, fully exploited, and fully appreciated:

> 'In the dim and distant days before the war, reformers were wont to say, 'Oh, if only the people would do so and so!' Under the rigorous prod of Mars, they have learned to say, 'The people MUST do this and that — go out and advertise and make them come through'[3].

Advertising is an agent of change inasmuch as advertising has the power to modify public opinion. Hi-tech adverts have helped to promote the use of highly efficient and effective computer systems and products. However, advertising tends not to promote radical or revolutionary ideas and philosophies. It is often a conservative force which proves that the accepted mores and codes of behaviour that predominate in society are the best of all possible choices. Advertising reinforces the status quo, but additionally promises benefits to the consumer.

The rhetoric of promise

Modern advertising promises benefits to the consumer on at least two different levels. First, the advertiser promises benefits which are directly related to the product. The product is described as high quality, innovative, exciting, etc. In the world of perfumery, the product's scent is advertised as sweeter or more appealing than its competitors. These are foreground benefits. The second level of benefits promised to the consumer (i.e. background benefits) relates to the enhancement of the consumer's life-style or environment. Using the perfume example, the product promises to improve the consumer's looks and increase sex appeal, and in so doing the advert reinforces the role of woman as an object of desire for man (or vice versa).

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Static advertisements, in newspapers and journals, have limited copy space. Every word is precious: every word must reinforce the message. In our study, rhetoric includes not only the copy, but also the pictorial images. The importance of both can be seen clearly in the context of hi-tech product advertising where images and language are harmoniously combined to capture reader/viewer interest.

Hi-tech advertising must be continually redefined to suit changing markets. The imagery, symbolism and mythology of hi-tech advertisements have broadened from the esoteric, and been reconceptualised to court a mass audience. Computers are no longer a minority product appealing exclusively to a highly specialised market of technologically literate consumers. The commoditisation of the personal computer, in particular, has created a mass market, and the resulting change is reflected in the language and symbolism used by advertisers.

Methodology

The purpose of this study is to examine the characteristics of static advertisements describing hi-tech information products and companies in order to discover the ways in which foreground benefits and background benefits are presented to the reader. The study also analyses the types of benefits offered. The adverts examined are randomly chosen from a number of national newspapers and journals. The adverts are divided into classes, dependent on the products advertised, and are then subdivided into clusters employing similar formats or rhetorical flourishes.

The analytical method is taken from the literature of structuralism and semiology. A modified version of the structuralist theory of binary opposites is used which provides an overall guide to the anchor terms favoured by copywriters serving hi-tech manufacturers. The examples which follow are drawn from a sample of some 100 recent adverts which have appeared in the popular press.

Binary opposites consist of two words, or 'constituent units', which bear a defining relationship to each other. Langholz Leymore has identified three types of oppositions[4]. The first type, described as the 'digital type', is composed of oppositions in the same sense as in logic, for example, male/non-male, where non-male is inevitably female. The second type of opposition is described as the 'analogue type'. Here the oppositions are composed of comparative gradings on the same implicit dimension in respect to the same implicit norm. Langholz Leymore cites the opposites 'good/bad', where 'not good' is not necessarily bad and vice versa. The third type of oppositions is called the 'converse type', and is composed of oppositions which are mutually exclusive, for example, sun/moon. These oppositions are perceived as being in some sense converse to each other in the context of the copy.

Examples of favoured information industry opposites include: diversified/narrowed, compatibility/incompatibility, flexibility/inflexibility, full colour/monochrome, achievement/failure, compete/resign, hi-tech/low-tech, easy/difficult, smooth/turbulent, office/hell, dedication/neglect. The positive anchor terms constitute a litany of claimed or actual benefits offered.

In *Mythologies*, Barthes defines the principal figures of rhetoric as, 'a set of fixed, regulated, insistent figures, according to which the varied forms of the mythical signifier arrange themselves[5]. This study attempts to classify a number of adverts according to Barthes rhetorical figures (see below).

1. The inoculation: whereby 'one immunizes the contents of the collective imagination by means of a small inoculation of acknowledged evil; one thus protects it against the risk of generalised subversion.'
2. The privation of history: depriving the object of which the myth speaks of all its history. Either history evaporates, or the object can only come from eternity. 'It has been made for bourgeois man.'
3. Identification: 'The petit-bourgeois is a man unable to imagine the other. If he comes face to face with it, he blinds himself, ignores and denies it, or else transforms it into himself.' Otherness is reduced to sameness, or if irreducible, then otherness becomes exotic. However it is, other must fit into a recognised place.
4. Tautology: defining like by like. 'In tautology, there is a double murder: one kills rationality because it resists one; one kills language because it betrays one.'
5. Neither-norism: 'stating two opposites and balancing one by the other so as to reject them both. (I want neither this nor that)'. Degraded forms include astrology, in which bad luck is followed by compensatory good luck, producing a meaningless equilibrium.
6. Quantification of quality: 'By reducing any quality to quantity, myth economises intelligence: it understands reality more cheaply.'
7. The statement of fact: myth tends towards proverbs, but whereas the ancestral proverb might prove useful in the natural world, mythological proverbs relate to the man-made world. They are the justification, the 'because', the commonsense of conservative society.

This paper includes one example of each rhetorical figure described by Barthes, with the exception of the tautology figure, as few advertisements display this rhetorical device.

Privation of history

Siemens

The Siemens' Padua advert juxtaposes the old and the new by defining both in terms of progress. Siemens' own role in the city's history is considered in terms of the roles of Galileo, Petrarch, Giotto and Dontello. To underline the point, the reader is informed that at the heart of the Siemens innovation is an interactive graphics system which will entirely replace traditional cartography. Padua has always been a progressive city, and is still a progressive city because Padua has installed Siemens equipment. This is an identification advert in which art, culture and technology are all reduced to sameness by Siemens.

The pictorial image is equally direct. The profile of a Romano-Greek classical man, robed, curly-headed and bearded, looks at a computerised map on a VDU screen. An established figure of ancient civilisation comes face to interface with the symbol of civilisation of today and tomorrow.

Identification

Siemens

Siemens' Chinese advert concentrates on the increased co-operation needed between countries in an ever shrinking global business environment. As part of the German-Chinese co-operation, Siemens have installed information systems in the Chinese Patents Office. This is another identification advert, but here although China is recognised as exotic, it too is reduced to sameness by Siemens. The accompanying photograph repeats the profiled gaze pose of the Padua advert, only it is a Chinese profile that is here directed at a combination of numbers and Chinese characters on a VDU. East meets West in the capable, and adaptable hands of Siemens.

Statement of fact

Ericsson-Adidas

'Strong companies choose strong partners'

The three-striped logo of Adidas and the three-striped logo of Ericsson together symbolise 'dedication to achievement'. Ericsson's potted history of Adidas reads like a rags to riches fairytale. The opening sentence establishes the vital point: 'The three stripes are known throughout the world'. Although the surface meaning of the phrase relates to the Adidas stripes, the reader is aware that by extension, the phrase also relates to Ericsson. The Adidas name receives the full-blown poetic treatment. 'And as the players and athletes began lining up victories in their three striped shoes, the name gradually acquired a ring of magic. ''Adidas'''. The magical logo is followed by the tale of the rise to glory of the original Adidas cobbler with a dream. His dream became reality and has led to countless victories, 'victory' being used three times in the text: people choose Adidas because they are the best; Adidas choose Ericsson because they are the best. All is for the best in this, the best of all possible worlds.

Important anchor terms include: 'vision', used twice, 'best' used three times, 'importance', used twice and 'world' used three times. The verb 'to choose' is used six times, once in the first half of the advert, the Adidas half, and five times in the second half of the advert, the Ericsson half. This is a commonsense, statement-of-fact advert which revels in catch phrases.

Neither-norism

IBM

'Tom A. to Tom E. We're sorting the whole thing out.'

IBM strike gold again. Eyecatching, amusing, classy and urbane, this advert succeeds through apparent understatement. The tomato in the photograph is surrounded and supported by white marble. It is an unusual pictorial image for a computer company, and reflects the confidence that IBM have, or appear to have, regarding their public image. IBM, as the company know well, is a household name. Marble suggests 'quality', but the incongruous combination of marble and tomato suggests humour. This offbeat sense of humour is repeated in the headlines which refer to a popular Gershwin melody.

The text, though spartan, contains a number of effective anchor terms. IBM are 'delighted', IBM provide 'significant' help and 'experienced' people. IBM offered help and were accepted by the OED. It is a reversal of the usual roles. Other companies tend to be sought out. It is a reversal of roles which is affordable, indeed image enhancing, because of the associations and myths surrounding the OED. The advert is a 'neither-norism', which refers to two alternatives but does not actually make a choice between them. IBM balance one against the other and imply that they have the ability to make a choice between them.

Inoculation

AT&T

'Be King for a day'

AT&T live Martin Luther King's dream in this advert. The text is presented in bold type: 'Be King for a day', followed by three verses. The background is a soft grey sky which is filled with clouds and a moon (all that is missing is the white dove of peace). The first verse offers a rhetorical question: 'What better way to celebrate his birthday than by living his dream?' In verse two, AT&T proffer advice to the reader about how to fulfil King's dream, urging the reader, in a very direct fashion using the second person singular, to adopt humility, tolerance, fraternity and peace. 'Learn something new about a different culture. Commit yourself to world peace.' In verse three, AT&T explore their role in relation to King's ideals. They describe themselves as 'a corporation dedicated to bringing the world closer together', and deftly introduce a reference to their contribution to the Martin Luther King Federal Holiday Commission. The introduction of a materialistic concern has a potentially jarring effect after two verses of idealism, but AT&T counterbalance this by informing the reader that he can give something more important. Himself.

This advert is very skilful. Martin Luther King's dream, which could be interpreted in a way which might undermine the ideals and practices of capitalist multinationals like AT&T, is used to defend and celebrate AT&T. It is an inoculation figure which deprives King's words of their radical origins. The saintliness of Martin Luther King is shared by AT&T, and the tone of the advert is that of a sermon. Perhaps the cynic may regard it as sanctimonious cant, but it may appeal to many readers as its format so closely follows that of the versified homilies of greeting cards and the populist press. It utilises Christian beliefs and the textual and pictorial presentation of these beliefs in popular media.

Quantification of quality

Bell Atlantic

'One of America's largest telecom companies is One of America's largest financial services companies is One of America's largest independent computer maintenance companies. We're Bell Atlantic'.

One popular myth about Americans is that Americans, and especially Texans, are obsessed with size. Bell Atlantic's parent company may be based in Philadelphia, but the obsession with size still prevails. Big is beautiful and Bell Atlantic unashamedly indulge in grandiose rhetoric and quantification of quality. The headlines build on comparatives and superlatives and reach climatic and hyperbolic heights in the all-embracing statement, 'We're Bell Atlantic'. It is a clever and controlled gradation which results in the augmentation and aggrandisement of the company name.

The style of the headlines is echoed in the copy which treats Bell Atlantic's success in terms of control, gradation and planning. Their success is derived from 'internal expansion and carefully controlled acquisition', while their position in growth markets and management of opportunities are both 'strategic'. Their growth, which outpaces that of the general economy, is 'persistent and predictable', because Bell Atlantic are a company in control of their future. The company 'outperforms', 'outpaces', takes 'giant steps', 'increases' and is the 'preferred source of information and communication systems and services for our customers'. The expansive copy is illustrated by a small diagram showing the 'annualized total return' from January 1984 to December 1986. It would seem that a little statistical evidence, no matter how woolly, helps sell the success of a telecommunication company. As the language develops and the copy expands, building up an image of the success and superiority of Bell Atlantic, so the reader's confidence and trust in the company is developed, built up and expanded. By the end of the advert the full significance of the phrase 'We're Bell Atlantic' is made manifest.

Foreground and background benefits

The purpose of our study was to discover the ways in which foreground and background benefits are promised to the reader through means of language and pictorial images. It was hoped that the types of benefits offered would be revealed in the process. The analysis was based on two interpretative models, the tables of binary opposites and analysis using Barthes' rhetorical figures. These models were chosen because it was felt they would be useful in eliciting foreground and background benefits and the underlying structure of the adverts. The tables of binary opposites represented the linguistic parameters of the world of the adverts. They were based on the language used in the adverts and helped to reveal the foreground benefits promised by the advertiser. Analysis using rhetorical figures helps to reveal the background benefits promised in the rhetoric of the adverts.

Rhetorical figures are the linguistic structures through which key concepts are articulated. They are the structures through which the norms, morals and culture of the moment are represented as eternal and absolute values. In these hi-tech adverts, the rhetorical figures are the means through which the background benefits are highlighted.

The background benefits which are expressed through the rhetorical figures are composed of reinforcements of the ideals which form the basis of the shared culture of advertiser and reader. The background benefits are statements, repetitions and reiterations of the comfortable corporate world enjoyed by the reader and advertiser. Beneath the immediate language of the adverts, the advertisers promise to uphold and maintain the agreed values of the target segment.

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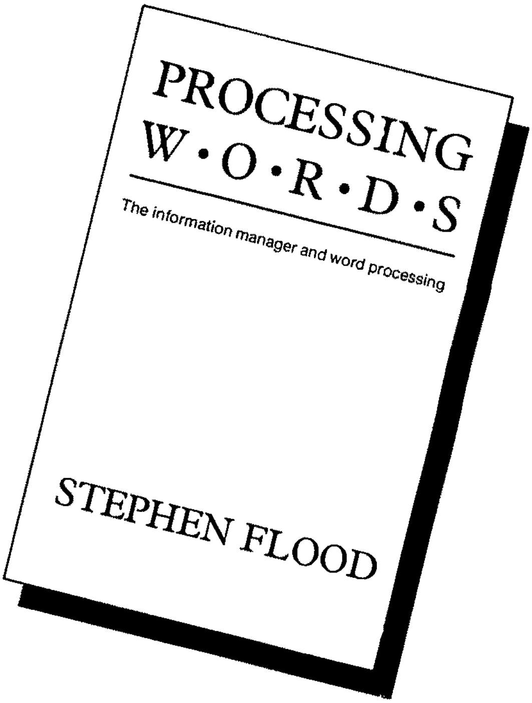

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The information society–idea or entity?

William J. Martin

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Why information society?

Whereas it has been commonplace over the years to describe societies as for example, agrarian or industrial, democratic or totalitarian, socialist or capitalist, it is scarcely surprising that an increasingly popular term today is that of the 'information society'. In this everyday context, with no deeper meaning either inferred nor intended, the term is simply a form of linguistic shorthand. As such it has acquired a fair amount of currency and even, a certain validity, although this in itself counts for little in terms of overall sociological meaning or significance.

While there has been no sustained attempt as yet by sociologists to construct a theory of the information society, such efforts are overdue and indeed, inevitable if there really is any substance to the phenomena it seeks to represent. In the meantime, unless one is prepared to accept the term simply as a convenient label for current developments within advanced societies, something more specific in the way of terminology and concepts must be sought. This is most certainly the case if by use of the term 'information society' is meant the transformation of existing society and its recasting in an information context. But if, as is generally accepted, information has existed and been of value in every age, why has it become so important today as to merit treatment as a symbol for the very age in which we live? This might seem to be a highly rhetorical question, bearing in mind the vast quantities of information, the sheer amount of research and development that underpins all those advances in computers and telecommunications that we now take for granted. Communications satellites, the electronic office, the home delivery of computer-based information and entertainment services–surely here is proof enough to render the question redundant? Well perhaps, but then why not a 'scientific' or a 'hi-tech' society? And in any case, is this not a somewhat narrow basis for the kind of generalised social change that is implicit in use of the term 'information society'?

That this kind of confusion occurs is partly to do with the literature of the information society, which in many instances is still heavily redolent of technological determinism. The fact remains that the information society as 'society' still has considerable ground to make up on the progress exhibited by its techno-economic manifestations. Any balanced assessment of societal status would of necessity have to account not only for the way in which societies earn their living, but also for general attitudes towards right and wrong and for concepts of community, social status, property and institutions.

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Studying the information society

Any attempt at studying the information society must at some point address two quite fundamental issues:

1. whether the context is that of the present or the future;
2. the need for some measure of consensus on the matter of terminology.

On the first point, such is the extent to which the term has entered everyday use that one could be forgiven for thinking that the information society was already a fact of life, at least in the most highly-developed countries. Indeed, the best-selling American author John Naisbett is sufficiently sure of his ground as to date the transformation from industrial to information society to the decade of the 1960s[1]. Naisbett was primarily concerned with events in the US and it would be unwise to generalise from this particular case, however important it might be. On the other hand, there is no lack of supporting evidence elsewhere, notably in Japan which is arguably the archetypal information society. Closer to home, Britain as a society has been described as being in the vanguard of those entering the information age[2].

This, of course, does not necessarily imply information society status and even in Japan there is more than a touch of futurism to this issue, with scholars like Masuda anticipating an essentially social transformation to the point where so-called 'information values' provide the formative force for the development of society[3]. That this is not entirely a matter of science fiction is evident in those changes that are taking place in the social, as well as in the physical infrastructure of a number of countries. Nevertheless, there is still some way to go before Masuda's 'Computopia' materialises or, indeed, a very different alternative, an automated state in which everything is controlled by computers. These potential developments have been presented somewhat less starkly in terms of a 'materialist' scenario in which society places considerable store by the goals of outward success, and alternatively, an 'autonomy' scenario, where the main motivation is a desire for self-fulfilment[2]. Whatever the outcome, however, the context is clearly that of the future.

What, then, of the matter of terminology and, specifically, of that need for consensus identified as the second fundamental issue attending the study of the information society? No matter how one regards the concept, it still requires something of an act of faith to advance the notion of a society in which information is the truly independent variable. To do so is to raise issues of virtually an ideological nature and, in effect, to reduce dramatically the list of potential candidates for information society status. If, on the other hand, what is envisaged is a society in which information is emerging as a new or newly appreciated variable, capable of affecting other variables and enhancing the overall quality of life, then one is faced with a much more realistic proposition.

Furthermore, general understanding of the information society concept would be greatly enhanced were it possible to assess developments within a 'real world' context. Dordick has made a useful contribution to this process of understanding. He suggests that, rather than viewing the process in absolute terms, we should envisage societies as featuring on a continuum leading by stages towards the information society[4]. Progress along this continuum can then be assessed in terms of such variables as the level of information consciousness, the environment for information processing, the development of information sectors or economies and the emergence of information-related goals and values. To ignore these gradations in development is to overtax such consensus on terminology as exists and makes the study of the information society an even more difficult task.

Criteria for the information society

Given the amount of attention paid to the subject in recent years, the nature and to some extent, the dimensions of the information society ought to be well-enough known. However, if comparisons are to be made and countries are to be assessed for information society status, then some knowledge of the conditions or criteria for such status becomes necessary. Although such criteria exist, they tend to be implicit and unstated rather than laid down in formal or deliberate fashion. Nonetheless, the Nora-Minc report in France clearly envisaged a link between technological and social concerns, between converging telecommunications and data processing technologies and policies for social and economic development[5]. Similarly, the European Community's Forecasting and Assessment in Science and Technology (FAST) programme on the information society recognises the interplay between techno-industrial and social issues. Dubbing this interplay the 'dual challenge', and anxious that technology be contained within a broader social and cultural context, rather than the other way round, this European initiative not only lays down criteria but also asserts the importance of cultural and social parameters within them. The FAST programme has identified five strategic issues for the information society: key technologies, Europe's position in the international information and communication system, alienation or integration in an information society, employment and education and training[6].

It is against this background that the criteria for the development of an information society presented in Table 1, were assembled. In this list, few individual criteria would be mutually exclusive, with each referring to a subclass rather than to one discrete or finite criterion.

TABLE 1. *Criteria for the development of an information society*

Technological criteria	IT as the key enabling force. Widespread diffusion of IT in offices, factories, education and the home.
Social criteria	Information as an enhancer of the quality of life. Widespread information-consciousness and end-user access to high-quality information.
Economic criteria	Information as a key economic factor: as resource, service, commodity, a source of added value and employment.

TABLE 1. — *continued*

Political criteria	Freedom of information leading to a political process characterised by increased participation and consensus.
Cultural criteria	Recognition of the cultural value of information through the promotion of information values in the interests of national and individual development.

This list of potential criteria is offered more by way of illustration than anything else, and certainly makes no claims to completeness. While decidedly futures-orientated, it contains sufficient recognisable elements to permit general state-of-the-art assessments of progress towards the development of an information society. Such assessments would benefit from an additional set of inputs, including numbers of computers of all kinds, estimates of the scale of transborder dataflow, statistics on the information industry, the share of information activities in the Gross National Product (GNP) and in the workforce, penetration by media of all kinds and numbers of people engaged in education and training.

What is the information society?

In attempting to reach some generally acceptable definition of the information society, certain points are worth bearing in mind. First, is the value of the continuum approach outlined above, with societies progressing towards more advanced stages of development, and ultimately to information society status, at their own pace and with varying results. Second, is the need to include consideration of wider social, and even philosophical, issues in arriving at a definition, issues such as the quality of life in a highly technocratic society. Third, is the temporal context and the fact that one is almost certainly talking about future rather than current developments.

Having said all this, however, the value of current developments should not be overlooked, and already there are sufficient indications of information-driven social change to lend some form of credibility to notions of an information society. These would include: structural economic change, particularly as regards distribution of the labour force; an increased awareness of the value of the information resource; a growing appreciation of the need for widespread computer literacy; the wholesale diffusion of information technologies; and government intervention in support of the key enabling technologies of computing, microelectronics and telecommunications.

Therefore, in the context of existing developments in the advanced industrial nations, one would define the information society as one in which the quality of life, as well as prospects for social change and economic development, depend increasingly on information and its exploitation. In such a society, living standards, patterns of work and leisure, the education system and the marketplace are all influenced markedly by advances in information and knowledge.

This is evidenced by an increasing array of information-intensive products and services, communicated through a wide range of media, many of them electronic in nature.

Implications of an information society

By definition, the concept of society as an information society carries the most far-reaching of implications for all its citizens. Whether such implications have positive or negative connotations depends very much upon individual and group points of view, in what is clearly a highly subjective area. To give just one example, there are clear parallels between the literature on the industrial revolution and that on the information society, especially as regards the existence of 'optimistic' and 'pessimistic' commentators. In essence, this is a distinction between those who are broadly in favour of the development of an information society and those who would prefer for it not to happen. For the optimists, Masuda predicts that society will indeed undergo dramatic changes typified not by struggles, wars and revolutions but by systematic orderly transformation[3]. On the other hand, observes Robbins, information technology should not be seen in terms of futuristic utopias and technological revolutions, but as a further stage in the subordination of social needs and values to technological rationalisation and the needs of the market[7].

Whereas opinion on this subject will doubtless continue to fluctuate across the spectrum from optimism to pessimism, there is no escaping the consequences of 'informatisation', nor evading the wide range of regulatory, technical, commercial and human issues that have emerged. In a paper such as this, one can do little more than highlight these issues, in this case by looking first at the implications for individual nation states and second, at those for the ordinary citizen.

In national terms there is the whole issue of economic competitiveness and indeed, survival in a world where increasingly the state of the balance of payments, levels of growth, welfare and employment are dependent upon developments in the information sector of the economy. As a related development, there are the perceived threats to national sovereignty both through the interdependence between nations that is a fact of life today, for example, within the European Community, and as a result of the activities of major multinational corporations. The economic and technological power of such organisations and the economies of scale which are frequently available to them, means that a large share of economic activity in many countries can actually be controlled from abroad. As a result, national sovereignty, or the ability of individual countries to exercise control over political, economic, social and cultural developments within their own borders can be adversely affected. Even in advanced, industrialised countries, moreover, there is an additional form of vulnerability through a growing reliance on electronic information and communication systems. Such reliance entails serious risks attendant on the possible breakdown of these systems, something which could cause massive economic and social disruption. Finally, for the emerging nations there is the danger of a continuance or re-emergence of colonialism in an electronic form, with Western domination of world trade in information goods and services, problems of access to the radiofrequency spectrum and the increasingly vexed question of transborder dataflows.

So far as individual citizens are concerned, there are a number of key areas of concern, including those of privacy, freedom of information and alienation. There are two essential aspects to the issue of personal privacy. The first is the protection of individual citizens from intrusions into their private lives. The second concerns potential intrusion through the misuse of personal information disclosed voluntarily by the injured party. Over 30 countries have now enacted privacy and data protection laws. Major considerations include whether such legislation should be 'omnibus' in nature, aimed at the protection of all data in whatever form, as tends to be the preference within Europe, or 'piecemeal' as obtained in the US. Other important aspects concern the definition of 'legal persons', that is, is this a company or a private individual?, and mechanisms for controlling the process both within individual states and on an international basis.

There is a clear connection between freedom of information and privacy, as reflected in the need to balance the one against the other. The concept of freedom of information is based upon the premise that, in a democracy, citizens should have reasonable access to information, particularly public information, except where there are security or similar considerations to be taken into account. It is ironic that in a country with such a long-standing tradition of parliamentary democracy as the UK, security considerations, among others, have prevented the introduction of legislation leading to freedom of information. This may be about to change in view of the Home Secretary's current proposals on the matter, proposals which incidentally have received a very lukewarm response from the freedom of information lobby. Whatever the protestations from either side of the argument, it seems time that something was done with regard to freedom of information. Quite clearly there will be abuses of any resulting legislation, abuses possibly leading to the embarassment or discomfiture of those in authority. Nevertheless, such abuses or potential abuses would seem to be part of the price to be paid for living in an open society. In any case, many activities liable to prosecution under the Official Secrets Act are innocuous indeed, while serious breaches of national security continue to occur despite the operation of the Act.

As employed here, alienation denotes a feeling of separation from society. It is a sense of being left behind by developments which, in effect, take on overtones of domination of the individual by the system. It is not too difficult to envisage how this could take effect in relation to the burgeoning growth of technology or again of unemployment. As a result, the European Community's FAST programme has identified as a strategic issue the matter of alienation or integration of the individual and of groups in an information society[6]. All such action is necessary, as is the need to educate and explain. Governments must acknowledge the fears that many ordinary people have in respect of new technology and the information society. They must listen rather than simply go on extolling the virtues of such developments.

Idea or entity?

These issues and others such as computer crime and intellectual property, are of concern to individuals and governments the world over. This in itself is further indication of the growing importance of the information factor in everyday life and with it, increased acceptance of the concept of an information society. It matters little that recent researches suggest the development of not 'one' but of many possible information societies, just as there are many industrial societies[2]. Nor need the absence of definitional consensus be any major cause for concern and indeed, if anything, the more varied the approach, the better is likely to be the overall level of understanding. 'Telematique', or the combination of information and communications technologies and services; an interactive infrastructure of technology, markets and politics; a society where information is central to social development and organisational management; or one where access to information, for everybody, is guaranteed–these are all valid and mutually-sustaining perceptions, which irrespective of their place on the conceptual and developmental spectra, provide a useful instrument for social observation. This instrument, the concept of an information society, still has some way to go before it becomes a reality rather than a plausible social construct. It is rather more idea than entity. However, as a concept it is certainly viable and the process of its realisation is already well advanced.

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An overview of microcomputer text retrieval packages

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Text retrieval software packages are designed to support the creation of textual rather than numerical, tabular or graphical databases. General trends concerning the nature of text retrieval software packages that run on microcomputers are analysed. A profile is drawn of the various features that can be expected of a text retrieval package, in order to build a picture of a typical package and to facilitate comparisons between packages. Factors that are considered are: price ranges, the length of time that packages have been available in the marketplace, contract and support, use and access, programming languages, outputs, retrieval facilities, interfaces and integrated modules. The market is shown still to be developing and changing.

Text retrieval software packages are designed to support the creation of textual rather than numerical, tabular or graphical databases. A large number of such software packages are available to run on mainframe computers, minicomputers and microcomputers. The *Directory of Software for Text Retrieval* has entries for approximately 32 such packages that run on mainframe and minicomputers, and 70 packages to run on microcomputers. In addition, a number of other software packages for which no entry has been supplied are listed in an appendix. The market for text retrieval software is large and is expected to grow significantly over the next few years. Applications of such software are countless. Wherever a computer system is used to store and retrieve text, a text retrieval software package may be employed. Text retrieval software has been exploited in handling library systems, patent records, medical records, newspaper cuttings, market intelligence, correspondence, personnel records, committee minutes and personal indexes, to list just a few of the actual and potential areas of application. Such a plethora of distinct areas of application, together with the increasing number of packages in the marketplace present difficulties for the new and not so new user in selecting a package that is appropriate for their particular application.

Directories such as (1) and (2) are an invaluable starting point for identifying potential software packages and reviewing some of their key features. This article analyses and summarises some of the data presented in (1) in order to identify general trends concerning the nature of text retrieval software that is available to run on microcomputers. A profile is drawn of various of the features that can be expected of a text retrieval software package, in order to offer a picture

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of the typical features of such packages, and to facilitate comparisons between a given software package and the norm. This should assist those involved in the selection of packages by indicating, in respect of some important features of packages, how common they are, and whether most packages can be expected to offer a certain facility. It is useful to know whether a feature that is important for a particular application, e.g. internal character masking, integrated word processing facilities, is normally available in text retrieval packages and the extent to which the need for this facility will narrow the choice of package.

Price ranges

The price of a package is in itself an important feature of the package and may be used to categorise the packages, but price must be considered alongside the other features of the package. Clearly, more sophisticated facilities would be expected of a more expensive package. No attempt is made here to tabulate or summarise the prices of microcomputer text retrieval packages because there are a variety of factors that determine the price, and pricing policies vary. Some microcomputer packages sell for a set price, such as Aquila, Cardbox, Swift, Delta and Wordfinder, but even versions of some of these may sometimes be found discounted or available at special rates to certain groups. Many packages have a price range which covers different configurations and modules of varying complexity and price. A common distinction in pricing policy for microcomputer packages is between the single user and the multi-user packages. Examples of multi-user packages include Librarian, TINman, Micro-CAIRS and Micro-STATUS. ASSASSIN PC, for example is £995 for the single user version and £2,500 upwards for the networked version. Different figures may also be quoted by suppliers for versions that operate under different operating systems. For example, STRIX is available for operating under MS-DOS at £550, under UNIX at £1,350 and under VAX at £3,500. Some packages such as RASMUS are available at discounts for multiple copies. In addition, prices of packages may be quoted in a variety of currencies and the price to, say, a British user, may depend upon the exchange rate into sterling at the time of purchase. In an attempt to identify a general picture, quite a number of the packages are available for less than £1,000, but others may cost several thousand pounds. Given this disparity in prices it is not surprising to find that the facilities offered by the packages vary considerably. It is not always, however, necessary to buy the most expensive package to obtain the facilities required. Sometimes quite sophisticated facilities are available in packages with a relatively modest price tag. It is important to evaluate each individual package.

Market availability

Figure 1 gives a distribution of the ages of the packages, and gives a general picture of the development of the text retrieval microcomputer software marketplace. The acquisition of any package that is relatively new to the marketplace is something of a gamble, since it will not have established a reputation and a user base and may still have teething bugs. Microcomputer packages tend to have a shorter history than mainframe or minicomputer packages, but nevertheless many microcomputer packages have now been on the market for between two and six years.

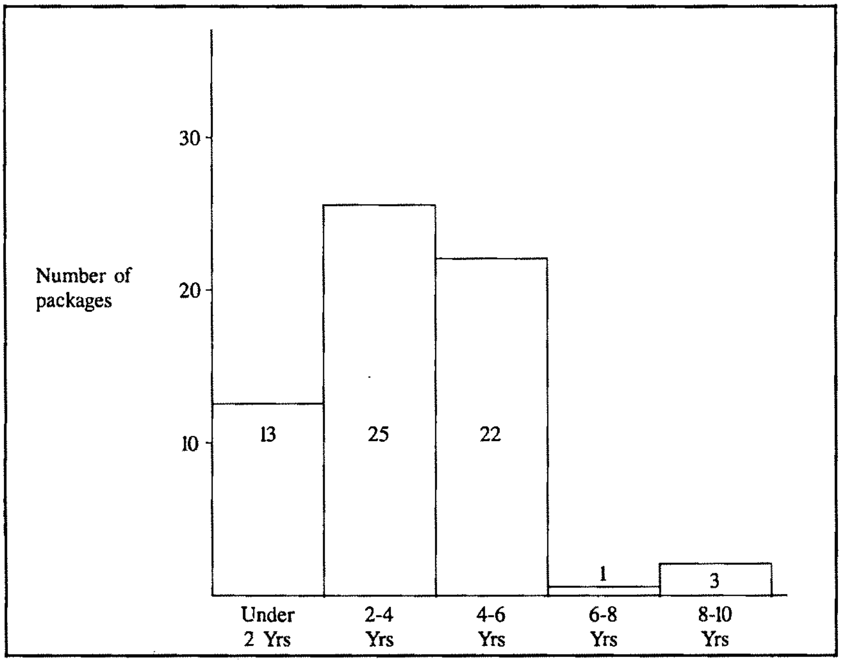

FIGURE 1: *Market availability*

Packages that have been available for more than six years are unusual since major growth in this area dates from about six years ago. There are still newcomers entering the market as is demonstrated by the relatively high number of packages to appear on the market in the last two years. The market is still fluid. More newcomers can be expected and some existing packages will cease trading over the next few years. Most packages are upgraded on an annual cycle or continuously, so that the version on the market now may not be the same as that which was available a year or two ago, and compatibility between different versions of the software and databases created under these versions will vary.

Contract and support

As packages become better established and the market becomes more stable, better contract and support arrangements can be expected. Some microcomputer packages are weak in this area, since adequate support can be expensive to maintain. Nevertheless, it is surprising the extent to which well-supported microcomputer packages are now to be found in the marketplace: 26 packages offer some maintenance contract arrangement. The more expensive microcomputer packages tend to be those offering maintenance arrangements, although maintenance can be charged at a relatively high percentage of the initial purchase price. Some packages such as DATAFLEX and MIRABILIS will negotiate a maintenance contract, whilst others, such as STRIX charge a fixed rate. It is important to recognise that over a period of a few years the cumulative maintenance charges may well outstrip the initial purchase price.

Facility	Manuals	Help desk	Training	User group
Number of packages offering facility	57	40	41	20

FIGURE 2: *Contract and support*

Figure 2 demonstrates the availability of various other support facilities. Manuals constitute a basic adjunct to any piece of software. Most packages do have a manual. Indeed, it is surprising that there remain packages on the market that do not indicate that a manual is available. Other support in the form of help desks and training are also surprisingly widely available. Naturally, the quality of both of these may vary considerably between packages, and the cost of training may, in some instances, be regarded as prohibitive. A number of packages also have user groups, although many of the cheaper packages do not boast this kind of support. The relative cost of support may be high as is well demonstrated by DELTA. The package costs £495, whilst user club membership is £100 per annum, on site training is £265 per day and off site training is £115 per day.

Use and access

Figure 3 summarises various aspects of use of the packages, including the maximum number of simultaneous users that the package will support, any significant restrictions on record size, and the nature of security arrangements that are part of the software.

The number of multi-user packages is increasing and many are operating on local area networks, so that many of the packages have no restriction on the maximum number of simultaneous users except that imposed by the hardware. A good number of packages have some restriction on numbers of users, ranging from three simultaneous users to 256 simultaneous users, so these packages would be suitable for some multi-user situations, but not others. There is still a market for the cheap single user package and several of the packages cater solely for this market, but the bulk of packages are now multi-user.

Record size restrictions are still relatively common with microcomputer software. Restrictions may operate in respect of the maximum record length, the maximum field length or the maximum number of fields per record. Again, the category with some record size restriction includes a range of restrictions, some of which are more severe than others. For example, Micro-CAIRS will cope with 99 fields and over 2,000 characters/field, whereas DELTA manages 90 fields/record and 80 characters/field and Cormorant offers 2,250 characters/record and 26 fields/record. Record size restrictions need to be considered carefully in relation to the nature of the database that is required for a specific application.

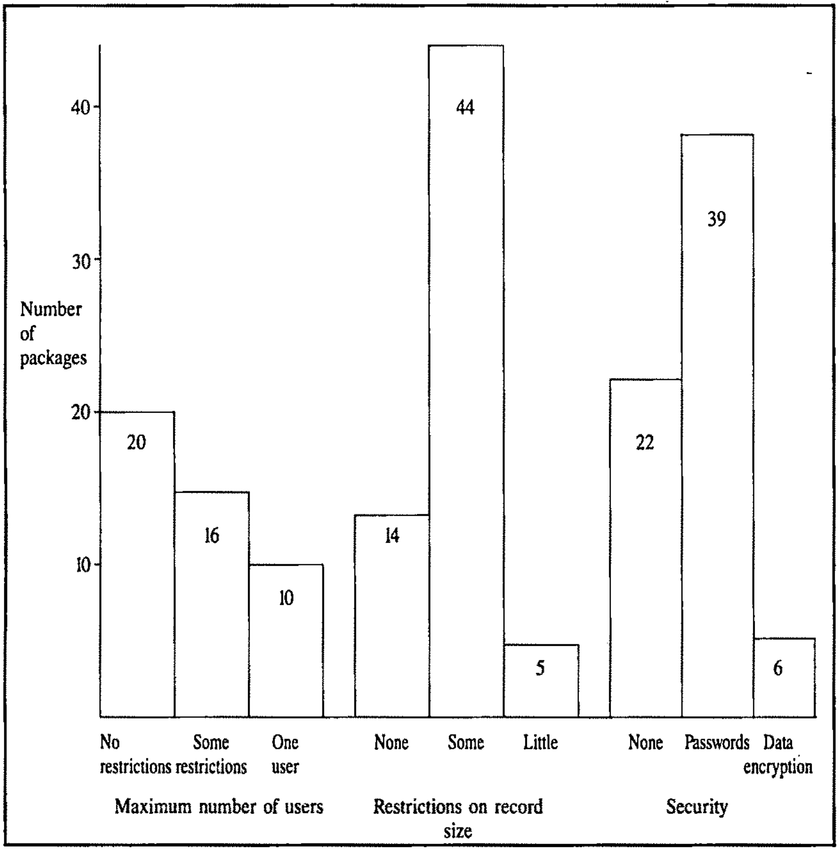

FIGURE 3: *Aspects of use*

Security of databases is particularly important when confidential information is being stored, but needs also to be considered in the maintenance of the integrity of a database. In general microcomputer packages have not in the past been very sophisticated in their approach to security. With single user systems it is satisfactory to leave security in the hands of the individual who created the database and security is associated with the security of the floppy disk on which the database is stored. In multi-user systems, security of different kinds, covering, for instance read access and write access becomes important. A significant proportion of packages now offer password security, and a few offer data encryption either instead of or in addition to passwords.

Language	**Number of packages**
C	15
BASIC	11
ASSEMBLER	10
PASCAL	9
FORTRAN	3
COBOL	3
RTL2	1
DBASEII	1
MACHINE CODE	1
DATABUS	1

FIGURE 4: *Programming languages*

Programming languages

Figure 4 indicates the programming languages in which the various software packages are written. A good deal of diversity is evident and some packages are partly written in a high level language and partly written in assembler. Many of the newer packages are written in C or PASCAL, with BASIC being more popular for packages that entered the market earlier.

Facility	**Number of packages**
Stop-list	43
Go-list	13
Multi-word terms	17
Relationship indication	18

FIGURE 5: *Indexing*

Indexing

The presence of those special features which control the index keys that are stored in inverted and other files in order to facilitate effective searching are summarised in Figure 5.

Any summaries of indexing features is likely to be subject to ambiguities and inaccuracies. There is a great variation in the terminology used to describe similar concepts and many of the suppliers of the cheaper microcomputer packages do not provide clear information on this area. Nevertheless, Figure 5 does show some general trends. Stoplists are relatively common, but other facilities that support searching on controlled indexing terms are less common. A go-list, for example, of terms that are used as index terms, and which can be used in the automatic indexing of text is not common. Similarly the ability to handle multi-word terms as index terms and search terms, and some mechanism for storing the relationships between terms in the form of a thesaurus or similar list is only present in the more sophisticated packages. If these facilities are important in a given application a large proportion of the available packages will be eliminated from the selection by the application of these criteria.

Outputs

All software packages must have some means of displaying and printing part or all of the database. Many earlier packages merely offered the user a choice from a very limited number of pre-defined formats. Most packages on the market today offer the user the opportunity to design their own output forms: 56 of the 70 in this analysis offered user-defined outputs. Specialist output facilities to support current awareness applications such as selective dissemination of information are however less common, with only 17 of the packages offering such facilities.

Facility	Number of packages
Boolean query Formulation	55
Text string searching	53
Search refinement	46
Right hand truncation	42
Browse on index	41
Range searching	38
Nesting (bracketing)	37
Proximity/adjacency	32
Left hand truncation	30
Internal character masking	24

FIGURE 6: *Retrieval facilities*

Retrieval facilities

Figure 6 lists the main retrieval facilities that are regarded as fundamental to successful text retrieval, and that characterise a text retrieval package. The number of packages possessing each of the facilities is noted. All packages support online information retrieval, but some offer the full range of retrieval facilities which enhance the likelihood of a successful search. As is evident from Figure 6, a few packages are very limited in the retrieval facilities offered, or, at least, in the facilities that they say they offer. On the other hand, there is a good range of packages offering any given facility. Selection may involve deciding which retrieval facilities are most important for a given application, and identifying packages with an appropriate combination of facilities. It will probably be necessary also to take cost into account, and choose between, say, a cheaper software package which does not offer internal character masking and a more expensive one which does.

Boolean logic operators are available in most of the packages. This universal availability underlines the extensive use of the boolean logic operators, AND, OR and NOT in information retrieval. Text string searching is also very common. This is a relatively easy feature to offer, and can be particularly useful where the text to be searched is in free-language format. Related to text string searching is the ability to search on truncated stems. Right hand truncation is more frequently available than left hand truncation or internal character masking. Search refinement, or the ability to select a set of references, matching one criteria, and then to select further from that set by applying additional criteria, is also common, as is the ability to browse on an index of the terms in the database.

Interfaces and integrated modules

Whilst the nature and extent of the retrieval facilities offered by a package determine its calibre in the text retrieval function, integrated modules that support other areas such as graphics, spreadsheet compilation, word processing, etc. determine the extent to which the package can be used for full document storage and retrieval. Adequate word processing facilities are essential in any package which is used to store large quantities of text. Many documents are not only comprised of text, but also incorporate numbers in tables and various graphical displays. These supporting facilities can be made available either through a module that is an integral part of the package, or via an interface to other packages designed specifically for the other functions, such as word processing and spreadsheets. The interfaces and integrated functions available within a given package reveal the market in which the software is being sold. Two types of packages can be identified. Those which have integrated modules for, or interfaces with, the various types of business software, such as word processing and spreadsheets, and those with interfaces to, or integrated modules, for the various library housekeeping functions, such as cataloguing, circulation control and serials control. Some packages do offer a range of facilities which bridges both of these categories. Figure 7 summarises both:

- any interfaces that text retrieval software has with other types of software;
- where certain functions are available as an integral part of the software package itself.

The integrated functions say a little more about the nature of the packages themselves. The fraction of packages with integrated functions is quite small in every category, although there are a significant number of packages offering standard library housekeeping functions, such as acquisitions, circulation control, cataloguing and online public access catalogues. This is not surprising since the lineage of a body of these packages is through library housekeeping systems, and many will have begun life as software to support, for example, catalogue database creation. There is a rather smaller set which have special facilities for serials management. Downloading is also relatively widely available, and word processing facilities are not uncommon. However, many other facilities such as spreadsheets, financial modelling, graphics, electronic mail, handling chemical structures and accounting are difficult to find.

Rather more of the packages do offer an interface which permits data to be handled by other software for purposes of, for example, electronic mailing or spreadsheet creation and manipulation. This can be a very satisfactory situation since it allows the user to select the best package to perform individual functions, and to use a range of packages to make an integrated local system.

Facility	**Number of packages with interface**	**Number of packages with integrated module**
Downloading	27	20
Electronic mail	25	3
Graphics	16	3
Chemical structures	8	1
Spreadsheet	23	2
Accounting	18	2
Financial modelling	14	3
Word processing	44	13
Videotex	9	2
Acquisitions	7	17
Circulation control	6	17
Cataloguing	8	25
OPAC	10	19
Serials control	8	12
DBMS	18	17

FIGURE 7: *Interfaces and integrated modules*

Conclusion

The marketplace for text retrieval software for microcomputers is an important and growing market. This article has attempted to review and summarise some of the features of the software in the market by identifying general trends and summarising software features. It should assist those acquiring software in gaining an overview of the market, and help to provide them with questions to ask and features to seek in selecting a software package that suits their particular application.

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Use and abuse of statistics

Susan Hoyle
formerly Executive Director, Transport 2000

Paper presented at the Aslib Planning, Environment, Transport Information Group (PETIG) seminar on 'Sources of transport statistics' held on 8 June 1988 at Aslib, Information House

Ignorance, confusion and psychology

My first illustration, intended to show some of the problems facing those of us who use statistics to convey information to others, comes not from transport, but involves a giraffe called Victor, whom you may recall some years back becoming the focus of the nation's concern when he fell on his knees after being moved to a new zoo. Giraffes are not designed to be on their knees; they always stand, awake and asleep; and Victor's life was in grave danger. The radio news reporter asked the vet what chance Victor had of surviving the attempt to put him on his feet again. 'A 50/50 chance', said the vet. Victor died. The next day the reporter was back and thus accused the vet: 'You said he had a 50/50 chance and he's dead, so you were wrong, weren't you?' It is hard to know how to deal with this level of ignorance of what numbers mean, but people's nervousness around statements of probability in particular can be, and frequently are, taken advantage of.

Another problem is that the English language is a poor method of conveying statistical ideas. Even quite simple notions can be very hard to explain clearly. For example, at a recent conference in The Hague I suggested that it was likely that women over 85 walked proportionately more of their journeys than any other age-group. A member of my international audience understood me to say that most of the walking in the UK was by women over 85. . . The concept was very simple; explaining it is not.

Then there are psychological problems, to which all of us, ignorant, credulous or not, are prey. For example, in probability theory there is something called 'recency bias', which describes the observed fact that recent or overwhelming events bias one's perception of their probability. Thus, the King's Cross fire, for a time at least, caused, and perhaps still causes, many people to judge the underground to be significantly less safe than it in fact is.

I have heard of another instance of this. There was a live, outside broadcast on regional television some months ago, from a stretch of motorway which had been said to be especially dangerous. An official of the Department of Transport (DTp) was being interviewed on the side of the motorway, and he was saying, as the cars and lorries whizzed past him on their respective ways to London, Manchester, Leeds and Hull, how very safe this stretch was, whatever people might say. As he was speaking viewers were able to see, in

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real time, a car leave the road and climb the bank; other cars slowed down to see what the problem was, and then some more ploughed into them, and there was a pile-up. My point is that not only does this have a funny side (I am told no one was seriously hurt), but that what viewers saw did not necessarily contradict what the poor man was saying. It is possible that he was just very very unlucky.

How safe are motorways and children?

On the other hand, the DTp does persist in saying that motorways as a class of road are very safe, much safer than other classes of road. Transport 2000 (T2000) and others don't like this statement because it is not true. Fewer people are killed and seriously injured (KSI) per mile travelled, but it can be shown that much of this difference is due to the absence of pedestrians and cyclists from the motorways. Their KSI statistics account for almost a third of the total KSI. If you fail to allow for the absence of pedestrians etc from motorways, then you are giving the motorways credit, so to speak, for not killing or seriously injuring any of them. Motorists, lorry-drivers etc are made to look safer than they are on the motorways because the comparison subsumes categories which, in fact, are absent. If you compare for the actual traffic, then the motorways look more usual: still safer, but not dramatically so.

There are further problems with casualty figures: for example, declining figures for child accidents owe far more to the declining population of children than to road safety improvements – also to the declining exposure of children to traffic (parents giving lifts, children playing only under supervision, and so on). If safety is bought at the cost of the freedom to move of the more vulnerable road-users, then there are other questions to consider.

The frustratingly useful

It is not my job to outline what transport statistics are published: the other papers will do this. But I do want to talk about some of the problems they raise. Not all transport statistics come from the DTp, and indeed some of the most interesting come from elsewhere. For example, I find the information in *Social Trends* and the *General Household Survey* very interesting, but also the most frustrating. Take a table from the *GHS 1982*, which shows the frequency of bus use by age and sex: how many people use the bus at least once a day or week or month, or at least in the last six months. The 1982 results are actually published every year in the DTp's *Transport Statistics*, and for a transport pressure group like ours, they are fascinating: but they were a one-off, in 1982, and there is no similar breakdown for any other mode of transport, not even rail.

A case of abuse

So far I've talked about problems caused (i) by the ignorance of the audience, (ii) by the inadequacy of the language (or of the presenter) to get simple numerical ideas across, (iii) by the psychology with which we perceive probabilistic statements, (iv) by taking statistics out of context, and (v) by failing to maintain historical series. I would like to look further at abuses of statistics. My first example is taken from a recent publication, which shall remain nameless: it announced the London Regional Transport fares rises with a headline proclaiming '30% LRT breaks fare promise'. The accompanying article mentions rises of 'up to 33%' and the table features inter alia a 67% rise (caused by the abolition of short hop fares on night buses). It also says: 'Trying to defuse opposition to the increases, LRT claim that they average only 4.5%'.

The fact is that the rises *do* only average 4.5%, and that LRT can thus claim not to have broken its promise to keep rises within inflation. The discrepancy arises because the argument is actually about other things: LRT's policy on pre-paid tickets, and the removal of crewed buses (i.e. with conductors as well as drivers).

There are very important points to be made here: the pre-paid ticket policy, for example, tends to discriminate against people who are not in secure, probably full-time employment, whose employers will lend them money to buy the pre-paid tickets. But the account I have been quoting from gives no information at all about the price rises for the pre-paid categories. I happen to know that a two-zone Capitalcard has gone up by just 2.85%: it is a bargain and a delight to have one. People who are familiar with the argument are apt to be annoyed at such a partial presentation; those who are not familiar are just mystified.

Moving goalposts

Transport consumer groups often complain about the unreliability of reliability statistics. British Rail has moved the goalposts on those services for which they make figures available: InterCity services are on time if they are within 10 minutes of the advertised time, rather than five minutes as before. This makes comparisons down the years difficult, if not impossible. And please note, 'on time' refers only to arrival at the terminus. If the train from say Liverpool to London is 12 minutes late into Crewe and 20 minutes late into Stafford, missing its connections right, left and centre, but manages to catch up with itself and reaches Euston on time, then it is on time for statistical purposes, but there is no record (for these purposes) of the sad performance on the middle stretch.

Transport statistics ignore consumers. . .

Too many of these statistics are not meant for me. Yes, they are published, and they are in the public domain; but they are not meant for the perusal of the service-user. They are there for administrators, operators and politicians, and they measure the things which they want measured. As passengers, we want buses and trains to be reliable, clean, safe and not too expensive. As residents, we want to know very different things about lorries from what the hauliers are interested in. Operators want to know how the fleet is doing: how big it is, who owns it, what the revenue is and where it comes from, roughly how reliable it is, how many pass the tests. Much of this information is very useful to passengers/residents, but it is not collected with us in mind; and it betrays the bias of policy.

. . . and pedestrians!

Finally, I would like to focus attention on the very lean time pedestrians get in DTp statistics. The figures are there, in the *National Travel Survey*, and Transport 2000 makes a habit of ferreting them out and publishing them (in *Vital Travel Statistics*), but the figures which the DTp publishes each year virtually ignore walking as a form of transport. This is despite the fact that over a third of all journeys are totally on foot – and a much higher proportion of the journeys of the young, the old and the poor.

There are at least three ways of disguising the importance of walking. The first is to have no entry for 'pedestrians' or 'walking' in the index of *Transport Statistics*. Table 1.2 on journey purpose by mode mentions walk but 1.9 on transport casualty rates does not. A second way is to look at miles (or kilometres) travelled rather than journeys. Walking is not very important by distance, because pedestrian journeys are not usually very long: about 5% by distance each year is travelled on foot. The assumption is that a journey's value is reflected in its length: the longer the better. 'This has pernicious effects in land-use planning, by the way.' The other way to ignore walkers is to leave out journeys under one mile. I quote from the start of the published version of the *National Travel Survey*: 'Journeys under one mile are discussed in section 8. Most of these are walks. Elsewhere in this report, except where explicitly mentioned, JOURNEYS ARE TAKEN TO BE THOSE OF LENGTH ONE MILE OR MORE. Journeys of under one mile accounted for under 3% of total travel mileage.'

A postscript on useless figures

In the event, I have talked more about the abuse than the use of statistics, but anecdotes about abuse are more interesting.

I would like to add a postscript to this written version of my talk: the very afternoon I gave the talk, back at my office, an MP asked me for some information about the relationship between accidents and weather. In my trusty copy of *The Casualty Report 1987* (i.e. the road accident statistics), I found a table showing the number of different severities of accident on different kinds of road in different sorts of weather. Eureka! you may think. But not at all. What use is it to know how many accidents there were on motorways when it was raining, if you know neither how many vehicles travel in the rain on motorways nor how often it rains on motorways? I confess that I can see no use at all for these figures. Answers on a postcard please.

Statistics available from the Department of Transport

Judy Akinbolu
Department of Transport

Paper presented at the Aslib Planning, Environment, Transport Information Group (PETIG) seminar 'Sources of transport statistics' held on 8 June 1988 at Aslib, Information House

This paper looks briefly at the types of publication produced by the Department of Transport, and says something about the availability of unpublished information. To illustrate, I shall look at one or two areas in detail, outlining how data are collected, and how the information feeds into our system. However, I should like to start by saying a little about source guides.

Source guides

The most comprehensive general guide is the Central Statistical Office's (CSO) *Guide to Official Statistics.* This has a section on transport covering all types of transport statistics, from both within and outside Government, but concentrates on regular publications.

A new guide to sources is now available through the Transport Statistics Users Group. The group was formed about two years ago, as a forum for users of transport statistics. *The Directory of Sources and Contacts in Transport Statistics* provides information on what data are held by members of the group. For historical data sources, the most comprehensive guide is *Inland Transport Statistics Great Britain, 1900-1970* by D. L. Munby and A. H. Watson. Volume I covers railways, public road passenger transport, and London's transport, and a second volume is expected to cover private vehicles, roads, road haulage, and others.

The DTp has contributed to the DTI exercise on 'tradeable information' in which DTI issued a document called *Government Data Resources* to firms who might be willing to purchase information from Government departments for their own use. The emphasis was mainly on data held in electronic form, and we provided a list of databases that could be used to produce 'tradeable' information, which was included in the DTI document.

Types of publication

Most people are aware of our HMSO publications, but these are by no means all that are issued. Each year, we produce many statistical bulletins covering a wide range of topics, some of them regular and others which are occasional, or one-off, reports. In addition, results of surveys carried out by TRRL are

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published as TRRL Reports; press notices are released whenever there is some important information to announce; and of course answers to parliamentary questions often contain statistical information that is not published elsewhere. Finally, we provide ad hoc tabulations on request, provided resources are there and confidentiality restrictions will not be breached.

HMSO publications

The major publications in this area are *Transport Statistics Great Britain (TSGB)* and *Road Accidents Great Britain*, both of them annual, and the National Travel Survey report which has just been released. There is also a report, published by the Railways Inspectorate, on railway safety, which includes details of British Rail staff and operating statistics as well as accident reports.

Regular non-HMSO publications

Statistical bulletins published regularly by the DTp include:

New Motor Vehicle Registrations (monthly);
Road Goods Vehicles on Ro-Ro Ferries (quarterly);
Road Casualties, Great Britain (quarterly);
National Road Maintenance Condition Survey (annual);
Transport of Goods by Road in Great Britain (annual); and
General Trends in Shipping.

Other publications, produced jointly with other bodies, include:

Port Statistics (with British Ports Authority); and
Waterborne Freight in the UK (with Marine Transport Centre).

Titles of some of the most recent statistical bulletins are include in TSGB, and a list of all bulletins available can be obtained from the publications section of the Directorate.

There is also a quarterly publication of a more general nature, *Quarterly Transport Statistics*, which has recently been revised. It contains 14 tables of summary data, covering different areas of transport, now mainly with seasonally adjusted data and graphs chosen to illustrate the trends. This publication is useful as an indicator of what information can be obtained from the DTp, as well as being a source of summary statistics.

Occasional publications

Ad hoc publications produced in the past two years include:

Bus and Coach Statistics, Great Britain;
Bus and Coach Speed Survey, 1986;
Traffic Speeds on London Roads;

Vehicle Excise Duty Evasion in GB, 1984/85;
Transshipment of UK Deep-sea Trade 1976-84; and
British Rail Origin and Destination Survey, London and the South-East, 1981-82.

In addition, two review reports, *Review of the Stats 19 Road Accident Report Form,* and *Review of the Continuing Survey of Road Goods Transport,* have just been released. These are part of the series of 'review reports' on surveys carried out by the DTp at least once every five years, in order to ensure that the information being collected is still required, and is being obtained in the most effective way.

Non-published material

Frequent ad hoc tabulations are produced in the following areas, to answer requests from outside bodies:

Road traffic;
Ports statistics;
International road goods traffic;
UK road goods traffic;
Road accident statistics.

In all cases, the special tabulations can be provided, subject to confidentiality constraints, and resource limitations. In general, where more information is needed than can be obtained from published material, the DTp is willing to provide it if it is available.

Examples of how statistics are collected

I have taken two examples of surveys carried out by the Department, to illustrate how data are made available.

(i) *Continuing Survey of Road Goods Transport*
Data are collected regularly throughout the year from road hauliers. They are held on a database and analysed from that. The main results are published annually in a statistical bulletin–*The Transport of Goods by Road in Great Britain.* Other results are compiled as requested for use both within and outside the DTp. The survey provides input into policy decisions in all areas touching on road goods transport and heavy goods vehicles, e.g. estimates of road track costs; traffic forecasts for COBA; effects of changing upper weight limit for HGVs; indicator for measure of GDP; forecasting fuel use. It also provides road haulage statistics for the European Community. The review of this survey, mentioned earlier, recommends continuation of the survey, with some minor modifications.

(ii) *National Travel Survey*
A number of these surveys have been held over the years, most recently in 1985/86. The survey collects personal travel details from each member

of a sample of about 10,000 households. The latest report gives analyses of the results of the 1985/86 survey, with some comparison being made with previous years' results. As well as the published results, it is possible to purchase additional tabulations. The survey provides most of the currently available information about personal travel, and as with all DTp statistics provides input to policy decisions in the relevant areas.

Conclusion

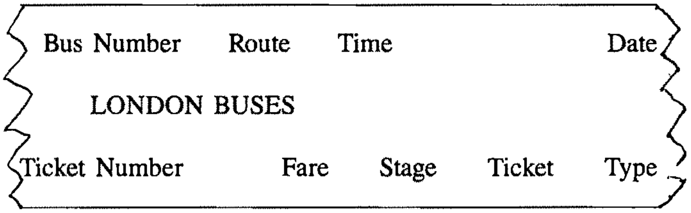
Clearly, it has not been possible to mention all data available within the DTp. I hope this brief resumé of some of the publications produced and surveys undertaken, has given you an insight into the types of information available. If you need a particular item of information, and are unable to find it in TSGB, for example, then it is worth contacting someone within the Statistics Directorate's publications unit. The new number for this, effective from the end of June 1988, is (01) 276 8540.

Sources of non-government transport statistics

Ernest Godward
Economist, RPT Economic Studies Group Limited and Chairman,
Transport Statistics Users Group

Paper presented at the Aslib Planning, Environment, Transport Information Group (PETIG) seminar 'Sources of transport statistics' held on 8 June 1988 at Aslib, Information House

We are, all of us, each and every day, a transport statistic. We probably do not realise the fact. As we purchase the ticket for our journey we are unwittingly entered into some computer system and thereby become a statistic. This, however, does not indicate that 'Big Brother' is watching you. The systems currently available would not know you from Adam. Taking a typical example; if you have travelled here by bus today your statistic will look as in Figure 1.



Bus Number Route Time Date

LONDON BUSES

Ticket Number Fare Stage Ticket Type

FIGURE 1. *The bus ticket, part of the transport statistical process.*

The copy of this statistic will be held as a computer record on the ticket machine and used for whatever purposes the operator sees fit. In view of this, the question must be asked for what reason do operators of transport (in the widest sense) collect statistics? There are probably four main reasons:

- as a method of account;
- to help plan the transport system;
- because the Government requires certain statistics;
- to understand the mechanics and processes relating to transport

Sources of statistics

What sources of non-Government transport statistics exist? We have heard an admirable exposition of what the Government can supply. These statistics are undoubtedly useful; but how do we answer the following questions:

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'I am trying to find transport statistics on X' where 'X' equals
A. Transport company;
B. Route/line/road;
C. Fleet;
D. Etc.

Supposing it is a company that we have been asked about, then a likely source of statistics concerning the company will come from it's annual report and accounts. Up until recently because many transport companies have been in the public domain, they are obliged to publish an annual report and accounts. Under the recent spate of privatisations/deregulations that have taken place this is not always the case. Where such information is published, it tends to be of a financial nature and there is little if anything concerning actual operations.

In the past, transport operators may have produced separate and usually detailed statistical reports, e.g. *West Midlands Passenger Transport Executive Annual Statistical Report.* A more likely source of detailed statistics is from regulatory/controlling bodies such as county councils/transport authorities as well as trade bodies, e.g. Freight Transport Association, the SMMT, the Ports Council, etc.

Not all organisations make their detailed statistics readily available, however. This is where the press and particularly the transport trade press come in very useful. Careful reading of the papers and magazines produced relating to transport can yield valuable sources of transport statistics. Many of the following list (not exhaustive) of publications can certainly provide summary statistics if not detailed statistics on a wide range of transport topics.

TABLE 1. *Transport magazines, newspapers, journals and newsletters*

— *Bus Business;*
— *Motor Transport;*
— *Modern Railways;*
— *Flight;*
— *Lloyds Shipping Economist;*
— *Transport (Journal of the Chartered Institute of Transport);*
— *Truck;*
— *Buses;*
— *Transportation;*
— *Transport Retort;*
— *Journal of Transport Economics and Policy;*
— *Railway Gazette International;*
— *Transport Economist;*
— *Newsletter of the Transport Statistics Users Group;*
— Transport Correspondents in Main Daily Newspapers;
— *The Economist;*
— *Modern Tramway and Light Rapid Transit,*
and many more.

Librarians are not the only people that find collecting and accessing statistics difficult. The professional transport analyst also finds the task not easy. I can remember being part of a team that put together information for an investigation by the Monopolies and Mergers Commission on the bus industry. I was involved in preparing a whole range of comparitive statistics relating to a variety of topics that the Commission wished to investigate. A lot of time and energy was wasted in chasing up statistics simply because there was no easy method of reference to the sources available.

It was also at about this time that the Statistics Users Council (SUC) in conjunction with the Chartered Institute of Transport (CIT) held its annual conference on the topic of transport statistics. Some 200 delegates from a wide variety of transport organisations attended. After the conference, a group of the delegates got together with the organisers to form a users group. The problem with the Statistics Users Council is that a particular topic only comes round every 10–15 years. With the support of the CIT and SUC the group called the Transport Statistics Users Group now has over 70 members. Members can either be corporate organisations or individuals. The aims of the group are as follows:

1. Identifying problems in the provision of statistics in the field of transport and discussing solutions with responsible authorities.
2. Providing a forum for the exchange of views on collection, provision and understanding of transport statistics.
3. Encouraging the proper use of transport statistics through publicity and education.
4. To carry out activities in keeping with the above three mentioned items, e.g. hold seminars and conferences, publish reports and directories, etc.

To date the group has held five seminars covering the following topics:

- abolition of met counties/privatisation and deregulation of the bus industry in urban areas;
- air transport statistics;
- transport statistics relating to the disabled;
- trade transport statistics;
- developments in the collection of transport statistics.

The group is intending to hold its next seminar in the autumn and this will be looking at Government transport statistics. Topics will include transport in the Census 1991. The Group are also holding a conference in March 1989 – TRANSTAT89. The group have also published a major work – *The Directory of Sources and Contacts in Transport Statistics.* This is free to members of the group who find it most useful. It can also be purchased for £15. Address for information relating to TSUG is Ernest Godward, RPT Economic Studies Group Ltd, 61 Southwark Street, London SE1 1SA.

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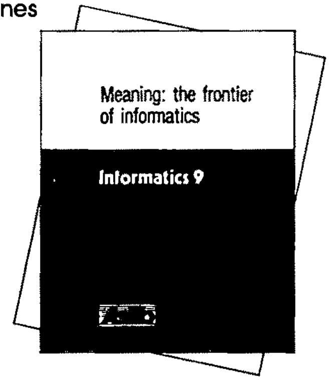

The challenging and thought-provoking proceedings of the ninth Aslib Informatics Conference are now available in published form. The conference was held in March 1987 at Kings College, Cambridge, under the sponsorship of Aslib – the Association for Information Management, the Aslib Informatics Group and the Information Retrieval Specialist Group of the British Computer Society.

New information technology has acted as catalyst in the development of our intellectual approach to the concept of information and its communication. In attempting to translate natural language into a language that a machine can understand, it has been necessary to analyse language and its meaning. The exploration of what is fundamental to our social interaction – language – and how this relates to the development of technology is the theme of this conference.

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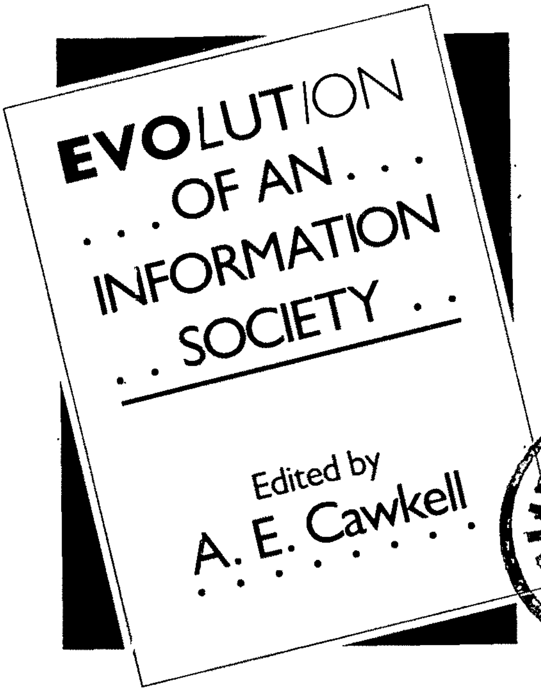

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